

PUBLIC WORKS

May
1952

CITY, COUNTY AND STATE

How Old Steel Bridges
Are Rehabilitated

Equipment Speeds Laying
of Water Mains

Better Refuse Collection
Through Cooperation

Keeping Two Jumps Ahead
in Airport Design

Solving the Rat Problem on
Refuse Dumps

How to Get Improvements in
Land Subdivisions

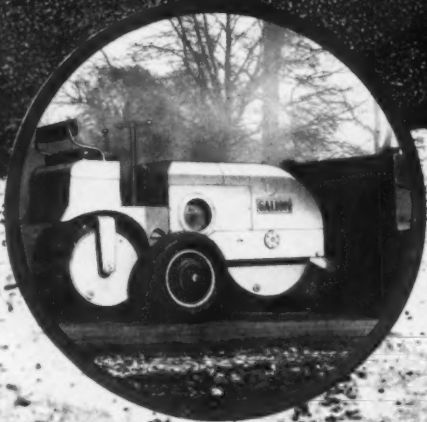


E. L. Schmidt at his desk following his appointment as Secretary of Highways of Pennsylvania. He was promoted to this post after outstanding service as Chief Engineer of the Department. More on page 24.

GALION

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TANDEM ROLLERS



FEATURES

- Hydraulic steering.
- Rugged spur gear drive.
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- Hydraulic hitch and transport attachments available (extra).

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Engineers for
FAIRFIELD, CONN.
Choose
**CHICAGO
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SYSTEM**

Aeration Tanks, Fairfield, Connecticut Sewage Treatment Plant, with Chicago Swing Diffusers and Precision Diffuser Tubes. Air is supplied by three Chicago Standard-air Blowers. Two Blowers are direct connected to electric motors and have a capacity of 2000 cfm each at 6.5 psi. One Blower is direct connected to a gas engine and has a capacity of 2100 cfm at 6.5 psi. Design flow of the plant is 4 M.G.D. Bowe, Albertson & Associates, Engineers.

The City of Fairfield, Connecticut, is assured of continuous and economical operation of the aeration battery in their new Activated Sludge Sewage Treatment Plant. Bowe, Albertson & Associates, Engineers, specified a Chicago Air Diffusion System to provide complete equipment for sewage aeration. Everything necessary from air to water is specifically designed and engineered as a unit to treat sewage and industrial wastes. The Chicago Standardair Blower, Swing Diffusers and Precision Diffuser Tubes provide efficient, quiet, continuous operation at low cost. Over 100 Chicago Air Diffusion Systems have been

specified or installed in Sewage Treatment Plants.

Other Chicago Sewage Equipment makes possible the most economical and efficient operation of the plant. Two Chicago Comminutors cut coarse sewage matter into small settleable solids without removal from the channel. One 10" and two 8" Chicago Vertical Open Shaft Non-Clog Pumps handle the raw sewage. Everything was done to provide the City of Fairfield with a Sewage Treatment Plant that would deliver a clear, sparkling effluent. Shellfish beds in Long Island Sound and the recreational aspects of the surrounding waters will not be contaminated.

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SEWAGE
EQUIPMENT**

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SEWAGE EQUIPMENT DIVISION

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Flush Klean, Scrub-Peller, Plunger,
Horizontal and Vertical Non-Clog
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Don't just take our word for the real, day-to-day usefulness of the Oliver "OC-3". Take the proof offered by the *thousands* of users . . . the *thousands* of uses . . . of this powerful little tractor. Just ask any owner what he thinks of his "OC-3". In the more than 12 years that the "OC-3" and its predecessor, the "HG", have been in production, they have built a reputation for user acceptance that's unequalled in their class. Proof of this is the fact that it's mighty hard to get a used "OC-3". Users just don't often sell their "OC-3" tractors.

With an "OC-3" and its broad line of matched equipment . . . bulldozer, trailbuilder, front end loader, lifting fork, sidewalk snow plow, hydraulic drawbar, winch, logging kits, and many others . . . you can perform all sorts of useful tasks *every day*.

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Why not have your Oliver Industrial Distributor give you all the facts on the "OC-3", the lowest priced industrial crawler tractor built. Call him or write direct to The Oliver Corporation, Industrial Division, 19300 Euclid Avenue, Cleveland 17, Ohio.



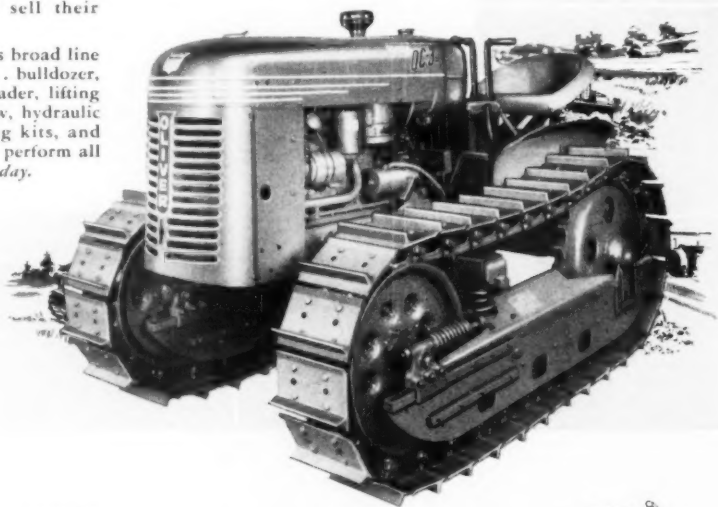
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Published Monthly by Public Works Journal Corporation, Office of Publication at Orange, Conn. Editorial and Advertising offices at 319 East 45th Street, New York 17, N. Y. Subscription rates: U.S.A. and possessions, \$2.00. All other countries, \$4.00. Single copies 50¢ each, except special issues which are \$1. Accepted under Section 2644, P. L. 86-6, authorized.

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PUBLIC WORKS JOURNAL CORP.
310 East 45th St., New York 17, N. Y.

Edited by W. A. Hardenbergh and A. Prescott Folwell



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The 1952 volume of Public Works will be available on microfilm through University Microfilms, 313 N. First St., Ann Arbor, Mich.

THE ENGINEERING AUTHORITY
IN THE CITY-COUNTY-STATE FIELD



announcing
THE NEW
BUFFALO-SPRINGFIELD
c-model
TANDEM ROLLER

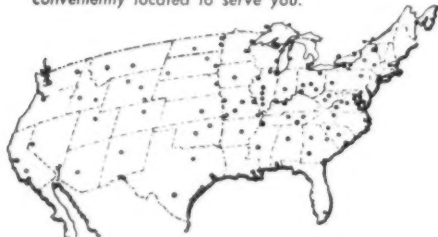
with Major Engineering Advancements no other roller can offer!

New open grill allows operator to see roll edge directly through top of machine—work close to curbs, shoulders.

Ground clearance increased to 17" on 5 to 9 ton tandems, 20" on 8 to 14 ton tandems for rolling close to high curbs and other obstructions.

Transmission and bevel gear final drive protected by heavy steel plate housing—eliminates possibility of damage when it scrapes against obstructions.

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Send for specifications today.

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Get full details of this month's new products . . . mail your Readers' Service card today.

THE EDITOR'S POINT OF VIEW



Taking Inventory for Better Water Works

IN the spring a man's fancy turns—to all those jobs at the water plant and out on the distribution system which were delayed because of winter weather. But before we become lost in the maze of work that confronts us, let's sit down, look around, and take inventory.

In many communities the water works superintendent is the only person who knows which switch to throw and which valve to turn. And, since most water works men are human, they suffer from the usual ailments common to the human race; and disasters, either natural or man-made, are no respecter of place or position.

What would happen in your town if your water works superintendent became ill? Is there anyone else who can keep safe water available? If disaster should occur, is there anyone else who could keep the plant in operation?

The community that depends on one man for the "know-how" of operating its water plant is perhaps stretching its luck. The continued operation of the water plant, even under most adverse conditions, is vital. At least one person other than the water works superintendent should be thoroughly familiar with your water works. Equally important to operation is a permanent record of the system. This should include the locations and sizes of all water mains; the location, size, year and make of all valves and hydrants; and record of when these were last operated. The form of such a record is not too important—the important point is that there be such records, that they be in a permanent and usable form and that they be kept up to date.

We thank "Over the Spillway" of the Illinois State Department of Health for this timely and excellent editorial.

Programs for Field Training

HEADED by Prof. William C. Gibson of the University of Michigan, a subcommittee of the American Public Health Association has completed its third year of a four year program of planning for field training. The report for the current year, which is now available, covers the administration and supervision of field training programs, their financing, and the methods of

evaluating them. We have discussed many times on this page, and elsewhere, the need for more and better training programs. It is refreshing to find that sound progress is being made in at least one segment of the field of public works and we hope that the job that has been done will serve as both incentive and guide to others.

That Centennial of Engineering Progress

SPONSORED by leading engineering societies and other organizations, the celebration to mark a century of engineering progress will begin in Chicago this year. This is fine; and it is worthy of support by every engineer, including a personal visit. On the other hand, hardly a start has been made in educating the public and the other professions to the true capabilities of engineers. Much more needs to be done. We hope and believe that this centennial is but the first step in an essential long-range program toward this end.

Subdivisions and Industrial Developments

MANY cities have the problems of water supply, street construction and maintenance, sewer service and refuse collection and disposal arise in connection with subdivisions or annexed areas. In general, cities have found that lack of sound planning has made especially difficult the financial and management problems incident to these areas.

Likewise, most cities, in accordance with the American habit, have desired additional industries to provide more employment for their citizens and to furnish a broader tax base. Just as with residential areas, sound planning for industrial developments has too often been overlooked. By this, we mean to include not only water supply, transportation and waste disposal, but also the provision for industry of adequate areas of a suitable nature, which will provide desirable surroundings, room for growth, transportation and those other factors which will tend to create a type of industrial development of which the community may be proud.

In each community that wants more industry, thought should be given to these factors. A committee of representative skills, covering engineering, transportation, industry, labor and government might well be created in each community. We believe it would be a paying proposition.

How to Build



PREPARES THE SITE.

A Drott Bulleclam on a rugged International crawler scoops out a trench for sanitary fill. Richmond calls this specially-designed unit a regular one-man sanitation squad.



**SPREADS AND
COMPACTS REFUSE.**



**TRANSPORTS AND
SPREADS EARTH COVER.**

The Bulleclam covers each day's refuse at the end of the day. Nearby homeowners report no bad smells or flies, are pleased to see wasteland improved.



**GRADES AND LEVELS
FINISHED AREA.**

Need more facts about advertised products? Mail your Readers' Service card now.

a Playground

Richmond, Virginia, uses 1,000,000 cubic yards of refuse per year to turn worthless land into public parks

Cost per cubic yard is far below national average

Cities far distant from Virginia know that Richmond's big sanitary fill operation is a model for low-cost refuse disposal and land improvement.

Richmond runs six sanitary-fill sites at a time. Builds fills 15 to 40 feet deep. Uses International crawlers equipped with Drott Bullclams—the **ONLY** units specifically designed to do all four steps of the complete sanitary-fill job.

These "one-man sanitation squads" spread and crush refuse all day, cover with fresh earth each night, turn worthless wasteland into park-playgrounds.

Richmond disposes of 1,000,000 cubic yards of refuse a year, at a cost of only 9 cents a yard—and that figure includes operating costs and depreciation. Disposal areas are policed to keep out scavengers. The whole operation is a model of cleanliness and efficiency as well as economy.

If your city is not already doing it, more than likely you, too, can cut disposal costs and raise land values the International Crawler-Drott Bullclam way! Ask your International Industrial Distributor for details. Or write now to:

Drott Manufacturing Corporation, Milwaukee 8, Wisconsin

International Harvester Company, Chicago 1, Illinois

BULLCLAM BY



DROTT

POWER BY



INTERNATIONAL

POWER THAT PAYS



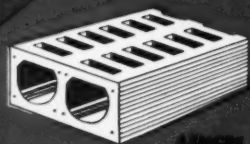
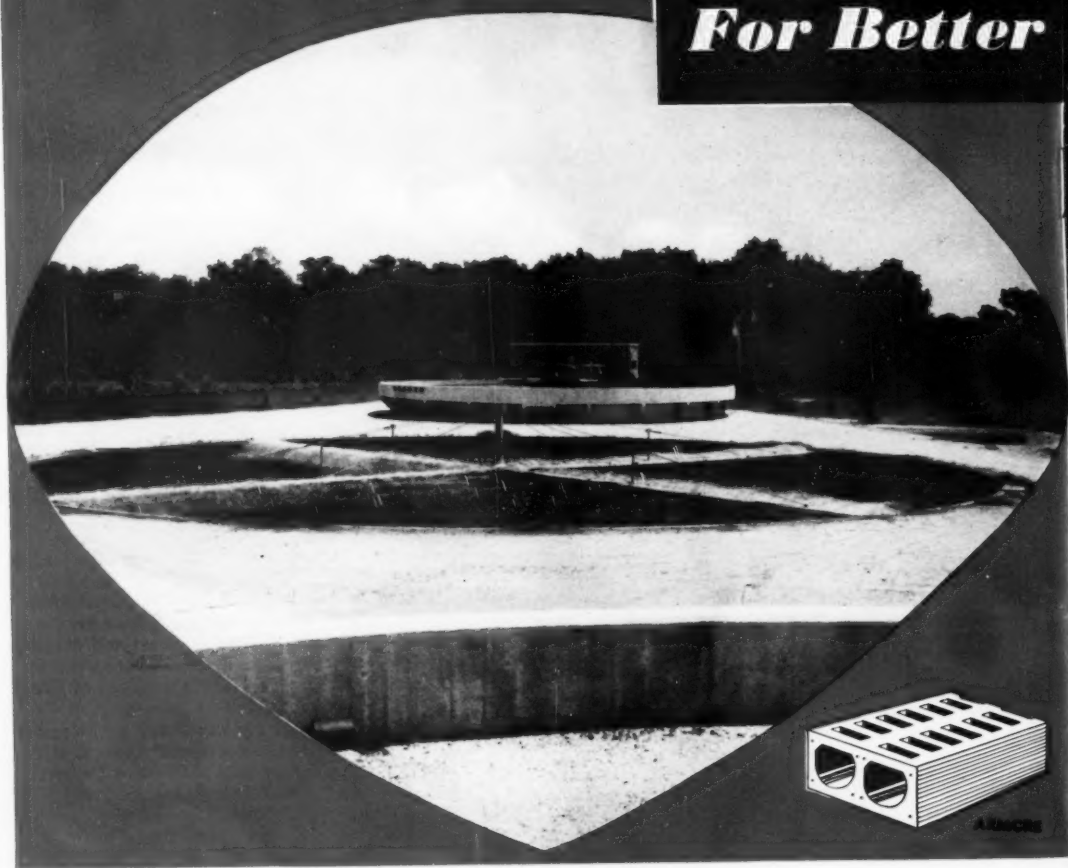
International power behind the specially-curved Bullclam front crushes trash and garbage flat. Sixty-five trucks bring refuse to Richmond's disposal sites.



When the Bullclam completes a job, the reclaimed land is ideal for parks, playgrounds and parking areas for future industrial sites.

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For Better



1

USE TFF INSTITUTE SPECIFICATION UNDERDRAINS

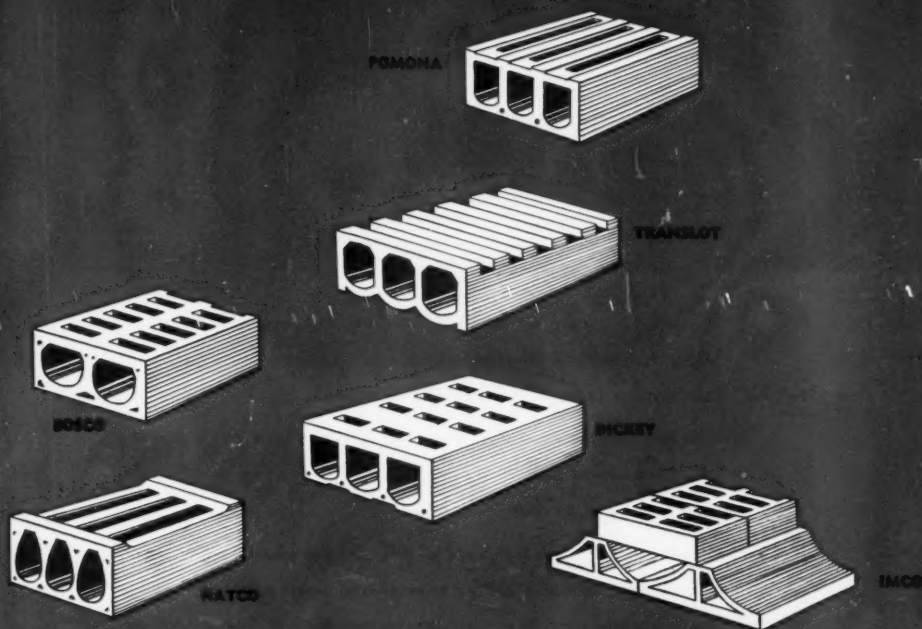
The scientific design of these *vitrified clay filter bottom blocks* insures trouble-free operation for the life of the filter. They have large top openings. That means proper ventilation of all filter media and free discharge of the filter effluent at all times. They have smooth run-off channels. That means quick drainage and no clogging even with years of operation. The blocks are light in weight, self-aligning and easy for unskilled labor to lay. After they have been laid they are strong enough to work on

and to support even very deep filter media.

These modern underdrain blocks will carry applications up to 50 MGAD. They are best for all kinds and shapes of filters. They are used everywhere better operating results are desired.

Use them to insure best results from your next trickling filter. Give it a *specification floor*. Use TFFI *vitrified clay filter bottom blocks*. For full engineering details write any member of this Institute today.

Trickling Filter Results



2 USE GOOD EQUIPMENT

Tomlinson Eng. Co. of Columbia, S. C. specified good equipment throughout the sewage treatment plant at Orangeburg. The filter pictured here has a 100' dia., 15" H rotary distributor handling a flow of 2,500 gpm. It was made by WALKER

PROCESS EQUIPMENT INC., a maker of fine quality products. In addition the engineers gave this filter a *specification* floor of vitrified clay filter bottom blocks . . . the finest kind of filter floor obtainable.

TRICKLING FILTER FLOOR INSTITUTE

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 Spiral Conveyors
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 Chains, Sprockets,
 Bearings

They do things up in a big way down in Texas, and Dallas is no exception. When it came to specifying the most modern equipment for treating sewage, Jeffrey received the call.

Screens, Grinders, and Grit Collectors . . . combined into a coordinated system to provide an efficient plant for this large and progressive city in the southwest.

We could name you hundreds of cities, as big as and often larger than Dallas, in which Jeffrey sewage and water treatment equipment is performing in a most satisfactory manner. Specify Jeffrey if you want the best . . . the most modern.

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New products . . . mail your Readers' Service card today.

A large, industrial Caterpillar diesel engine is shown in a factory or workshop setting. The engine is a complex piece of machinery with various pipes, valves, and a large flywheel. It is mounted on a concrete base. In the background, other similar engines and factory equipment are visible, creating a sense of a large-scale manufacturing environment.

Like 'em?...

count 'em!

"The number of engines we have tells what we think of 'Caterpillar' products," reports George L. Blackett, manager of the Wells Power Co., Wells, Nevada. At last count, the company had three D17000 and one D397 "Caterpillar" Diesel Electric Sets in operation. Together they can produce over 600 kw. per hour.

"Caterpillar" dependability breeds ease-of-mind and faith in the power company by customers of all sizes. One Wells Power Co. customer explained: "We don't worry about service — when you flip the switch you got power."

A larger customer indicated a similar feeling when it gave Wells Power Co. a contract to furnish power for installations being made in nearby television towers.

The dependability of "Cat" Diesel Electric Sets in multiple installations is matched by their economy. Units can be turned off as demand falls, and

turned on to meet peaks. This also gives protection for emergencies and relief for units being serviced.

Even the best equipment should receive good operator care. A few minutes of daily attention pays a large dividend in longer profitable life. And, all "Caterpillar" products are backed up by the reliable, quick service of "Caterpillar" Dealers.

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**DIESEL ENGINES
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Why has the World's Leading Manufacturer of Pumps taken the "Pump" out of its name?

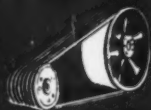
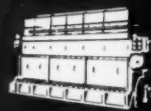
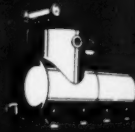
For 111 years "Worthington" has meant *pumps* to industry everywhere.

During this period, Worthington has developed a position of leadership in many related fields. Fourteen major product lines including pumps are manufactured in 21 plants throughout the world.

To those we serve, Worthington is *more than pumps*. That's why the world's leading manufacturer of pumps has changed its name from

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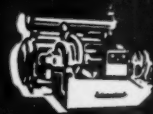
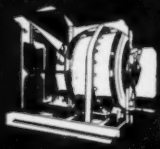
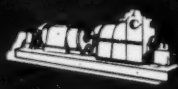
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The Sign of Value Around the World



Worthington Corporation



DRESSER JOINTS, FITTINGS, REPAIR CLAMPS, SLEEVES

**A complete line
for all types and
sizes of water pipe**



**FOR SUPPLY AND
DISTRIBUTION LINES
Style 38
DRESSER COUPLINGS**

Proved dependable for over sixty years, on thousands of miles of municipal supply and distribution mains. Special rubber gaskets make a permanent joint, flexible enough to permit laying curves with straight pipe. Wrench is only tool needed. Available for plain-end steel, cast iron or other pipe, $\frac{3}{4}$ " ID to 72" OD and larger.



**FOR SPLITS AND BREAKS IN
CAST IRON PIPE
Style 57C
REPAIR & TAP SLEEVE**

Handy sleeve repairs breaks, holes and splits in straight run of CIP quickly and securely, without service interruption. Highly adjustable for off-size pipe. Also makes a handy tapping sleeve, when needed. Sizes 4", 6", 8" CIP.



**FOR LEAKY BELL & SPIGOT JOINTS
Style 60
ADJUSTABLE BELL-JOINT CLAMP**

Highly adjustable Style 60 has wide use in water repair work. Especially good on locations subject to vibration, such as under railroad tracks, heavy traffic spots, and on bridges. Sizes 3" through 60" CIP.



**FOR BRANCH CONNECTIONS
TO EXISTING LINES
Style 91
PIPE SADDLE**

A quick easy way to make branch connections to existing lines when tapping sleeves, tees, or other methods are not desirable. Standard saddle is equipped with exclusive Dresser rubber gasket. Also available with lead gaskets or without gaskets. Malleable and steel construction for steel and CIP. Sizes 1 $\frac{1}{2}$ " to 20" OD.



**FOR JOINING SMALL PIPE
Style 65
"NO-THREAD" FITTINGS**

No threading or exact pipe alignment is necessary with these simple, speedy fittings. Just stab over plain pipe ends and tighten bolts with a wrench.

Style 90 (steel) for underground work, and Style 88 (brass) for copper tubing available. All standard shapes.



**FOR LEAKS, BREAKS, SPLITS
UP TO 8" IN CIP
Style 57C
CAST SPLIT SLEEVE**

Standard equipment with emergency crews for repairing unexpected breaks requiring immediate attention. Used successfully for years by water departments everywhere.

Each sleeve is tested with 60-lb. air pressure and 500-lb. hydrostatic pressure before shipment. Sizes 2" to 12" CIP.

Each Dresser Style is designed to meet a specific problem of pipe joining or repair. Convenient to use anywhere, Dresser Couplings are standard equipment with municipal water departments who appreciate the simplicity and speed of these couplings under difficult working conditions.

Shown above is a representative group of Dresser

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Barber-Greene

MODEL
543

BUCKET LOADER...



SAVES
LOADS

man power-truck time-money

all free-flowing materials
at 3 yds. per minute

Cost studies prove that nothing can compete with a Bucket Loader in lowest cost loading from stock piles to trucks.

The B-G constant flow principle virtually eliminates the human element — guarantees the same hourly production all day long, whether the operator is fresh or tired out.

The new Barber-Greene Model 543 is the last word in loading economy. Backed by over a billion cubic yards handled by its predecessors, this machine is ready to cut your loading costs.

The new hydraulically controlled trimmer-conveyor combines with time-proved B-G advantages — such as the Spiral Feed, Cleanup Scraper, automatic Overload Release and Floating Boom — to save appreciable manpower on every job. With its 15 m.p.h. road speed, the 543 can get to the job fast and move from pile to pile in a hurry. It is built for high production through years of low-cost service. In addition, it is convertible to a Snow Loader for year-round usefulness.



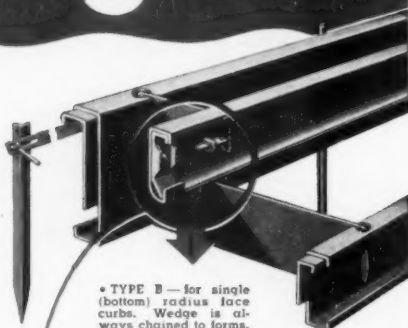
BARBER-GREENE COMPANY

AURORA, ILLINOIS, U. S. A.

New products . . . mail your Readers' Service card today.



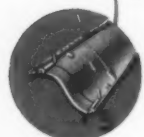
Heltzel steel forms augmented by various improvements through the years are the most rigid, advanced equipment obtainable. Your consideration of the many varied applications of these steel forms is respectfully invited. Write for Bulletin L-20.



• TYPE B — for single (bottom) radius face curbs. Wedge is always chained to forms.



• TYPE A — for straight face curbs (no radii). Slide lock is rigid, positive.



• TYPE C — for double radius (S-shaped) face curbs. Sliding dowels secure upper and lower extremities.



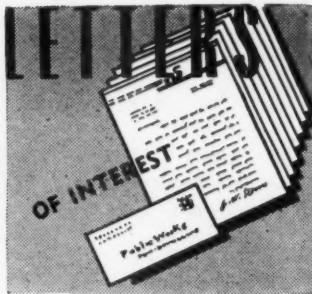
... and
**3 Optional
FACE CURB
FORM SUPPORTS**



HELTZEL

STEEL FORM & IRON CO.
WARREN, OHIO

Need more facts about advertised products? Mail your Readers' Service card now.



NATIONAL SKI PATROL SYSTEM

In your March 1952 issue of "Public Works", we were very pleased to see on pages 50 and 51 an article entitled "Colorado's Avalanche Control Program".

The National Ski Patrol System has played an important part in this since the members of the U. S. Forest Service and Army Corps of Engineers, in the particular case of avalanche control work, in Colorado, and mentioned in your article, are also all members of the National Ski Patrol System as individuals.

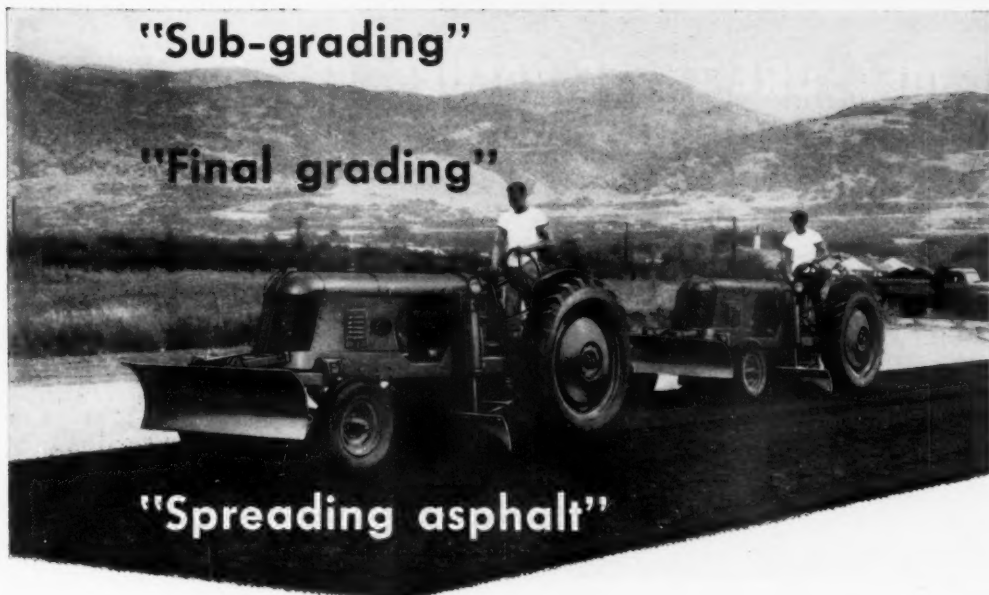
We would appreciate receiving 50 tear sheets of this article if it is possible for you to arrange it. If there is a cost involved, we will be glad to reimburse you.

It has been an "up-hill" battle getting acceptance of avalanche control work on state and federal levels. Your article will do us a tremendous amount of good in carrying this program into other states. We certainly want to thank you for your excellent efforts as evidenced by your fine article.

Edward F. Taylor,
National Director,
National Ski Patrol
System, Inc.,
Kittredge Bldg.,
Denver 2, Colo.

The TEXAS SHORT SCHOOL

Just to let you know you were missed by your many friends at the College Station Short School, which again broke the attendance record with 604. Earnest Boyce, E. P. DuBuque, Kerwin L. Mick and M. B. Cunningham all had fine papers. Dr. Cox, in his usual amiable way, reported on the progress made and on the annual awards. A miniature snow storm demonstration by Ford Hubbard of Dr. Irving Krick's organization was most interesting. The bottled water industry had a special



**"HUBER
MAINTAINERS ARE THE
Handiest Things!"**

H. Sessions & Sons of North Salt Lake, Utah, make many uses of a pair of Huber Maintainers in connection with the asphalt laying service they offer in Utah and nearby states. They've been in the business since 1945, a fact that adds significance to the comment of Mr. Sessions that "the Huber Maintainer is the handiest thing there is in a piece of machinery."

The 6,000-pound, 42½ H. P. Maintainers handle sub-grade and final grading work and spread asphalt. The two of them spread 500 tons in eight hours . . . on another job one of them spread 50 tons in 3½ hours. The Maintainers are "just the right size for laying asphalt," Mr. Sessions said.

Mr. Sessions needs only the Maintainer blade and the bulldozer attachment in his work . . . but you can have any or all of the other HYDRAULICALLY CONTROLLED attachments which enable the Maintainer to work as a lift-loader, highway mower, berm leveler, road planer, broom, snow plow or patch roller.

Huber Maintainers are handling scores of jobs for federal, state, county, municipal and township owners as well as contractors and other private users. Why not learn today, from your nearest Huber Distributor or by writing to the factory, what the Huber Maintainer can do to help you?

HUBER MANUFACTURING CO. • Marion, Ohio, U. S. A.

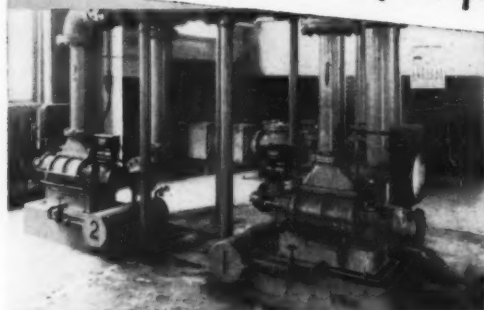
*Manufacturers of Huber Maintainers, Graders
and Complete Line of Rollers*



It's a fact . . . our handy Readers' Service card is the easy way to get new catalogs.

MEASURE THESE VALUES WHEN YOU BUY METERS

Accuracy·Capacity·Compactness



Part of an installation of nine R-C Positive Displacement Meters in large chemical plant. Capacities from 3,000 cfh to 130,000 cfh.

Industrial buyers rate R-C Positive Displacement Meters "tops" in these basic essentials.

Accuracy—Not affected by pressure, wide variations in loads or other variables. Simple design, with no vanes, valves or small parts, results in maintained accuracy over long years of operation.

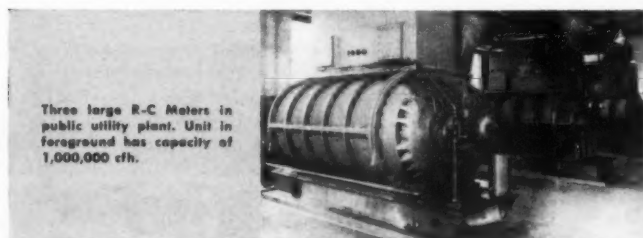
Capacity—from 4,000 cfh to 1,000,000 cfh in one unit, to meet practically any industrial metering requirements. Ample ability to absorb overloads.

Compactness—foot for foot of capacity, R-C Meters are the smallest made for industrial use. Can be "tucked away" in relatively small space without loss of valuable production area.

These values have long been proved by large and small industrial plants and public utilities. More R-C Meters are used by gas producing plants, for their own manufacturing and for commercial customers, than any other make. For details on sizes and construction, ask for Bulletin 40-B-14.

ROOTS-CONNERSVILLE BLOWER CORPORATION

524 Poplar Avenue, Connerville, Indiana



Three large R-C Meters in public utility plant. Unit in foreground has capacity of 1,000,000 cfh.

ROOTS-CONNERSVILLE

ONE OF THE DRESSER INDUSTRIES



Now's the time to mail this month's Readers' Service card.

session and are proposing that standards be promulgated for their industry.

The newly elected president of the organization is Alfred Neffendorf from Fredericksburg, Texas, the home of Admiral Nimitz. Mrs. Goodwin will send you shortly a summary of the meeting. Bob Gresham of the Southwest Water Works Journal will make available copies of snapshots he took at the school.

V. M. Ehlers,
Director, Bureau of
San. Engrg.,
State Department of
Health,
Austin, Texas

I just wanted you to know that I made the trip to the Texas Water and Sewage Short School a couple of weeks ago and enjoyed it very much. I appreciate your having started the ball rolling in this regard.

Kerwin L. Mick,
Chief Engr. & Supt.,
Minneapolis-St. Paul
San. Dist.,
St. Paul, Minn.

Ed. Note: We understand that Messrs. Mick and Boyce got themselves presented with those famous Texas Stetson hats with which the Short School folks honor some of the Yankees that come down and get Texanized.

LITTER COLLECTOR

In order that this government activity may make a detailed study of "Litter Collecting Vacuum Unit" as reported on page 37 of your January issue, it is requested that full details of operation, mounting and performance be forwarded. In the event the material is not available at this time, it is requested that the manufacturer's name and address be forwarded for direct reference.

J. A. Bentley, CDR
(CEC) USN,
Public Works Officer
Long Beach Naval
Shipyard,
Long Beach, Calif.

SEWAGE TREATMENT ALMANAC & GUIDE

Leave it to the Illinois Department of Health, Clarence Klassen, Chief Sanitary Engineer, to produce the sewerage's almanac. In many respects, it is an improvement on the original farmer's almanac. He might have some copies left: anyway, its worth 3 cents to try to get this 1952 edition of 24 data-filled pages.

THE PICKEREL:

One of the Navy's famed "Guppy" class emerges at a 48-degree angle from 150 ft. depth. That's performance! The kind of performance that has always characterized the ships and men of the "silent service" in peace and war.

Two years ago, the snorkel equipped Pickerel made a 5200 mile run in 21 days without resurfacing.



(OFFICIAL U. S. NAVY PHOTO)

Ships, Men and Engines!

**The Pickerel is equipped with
FAIRBANKS-MORSE Diesel Engines**



FAIRBANKS-MORSE,

a name worth remembering

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • ELECTRICAL MACHINERY • PUMPS • SCALES • RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

FAIRBANKS, MORSE & CO., 600 South Michigan Avenue, Chicago 5, Illinois

only Allis-Chalmers offers you

**History-
Making**

Tracto-Shovel

Thousands of Allis-Chalmers HD-5G 1-yd. front-end shovels are making history . . . handling an endless variety of excavating and material handling jobs faster, at lower cost than ever before.

Now . . . to meet the challenge of ever-increasing production demands, Allis-Chalmers *multiplies the scope of tractor usefulness even more.* And here's how.

The same basic design — the same versatility that made the HD-5G so useful can now be yours in 2-yd., 3-yd., and 4-yd. Tracto-Shovels. Combined with the unmatched performance of the new Allis-Chalmers tractors, they give you a real competitive advantage by bringing you a new, faster and better way of getting the job done.

A NEW ERA OF TRACTOR USEFULNESS

Pioneering New Methods — Tracto-Shovels are blazing new trails in excavating and material handling . . . doing traditional jobs in a new, better way.

A Size for Every Job — Faster, more efficient operation; at lower equipment investment.

All-'Round Versatility — Not limited to a specific type of operation. Quickly interchangeable attachments adapt Tracto-Shovels to different assignments *in minutes.* Simple truck or trailer transportation between jobs.

Built to Take It — These new Tracto-Shovels are the toughest, strongest ever built. Every part has ample size and strength to do its job.

**14 different
attachments**

Standard buckets, heavy-duty rock buckets, rock forks, bulldozer blades, light materials buckets (up to 7 cu. yd.) . . . plus other attachments for some models.

1 yd. HD-5G

40 Drawbar hp.
Dumping height (bucket hinge pin): 9 ft., ¼ in.
Total weight: 16,200 lb.

2 yd. HD-9G

72 Drawbar hp.
Dumping height (bucket hinge pin): 11 ft., 4 in.
Total weight: 29,900 lb.

3 yd. HD-15G

109 Drawbar hp.
Dumping height (bucket hinge pin): 12 ft., 8 in.
Total weight: 40,000 lb.

4 yd. HD-20G

Hydraulic torque converter drive
175 net engine hp.
Dumping height (bucket hinge pin): 13 ft., 5 in.
Total weight: 61,600 lb.

Advantages

NOW IN 3 NEW, BIGGER SIZES! *

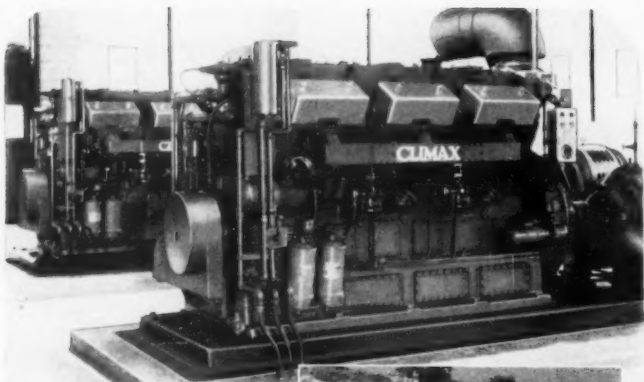


**World's Largest
Front-End Shovel**

— handles toughest
excavating and ma-
terials handling jobs
in a new, faster, bet-
ter way. Standard
bucket capacity —
4 yd.; light materials
capacity — 7 yd.

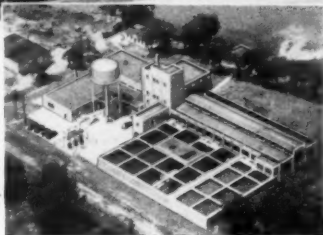
the newest, finest line on Earth!

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



Two Climax 420 H.P. 12 cylinder gasoline engines direct connected to 6 MGD centrifugal pumps in Municipal Water Works, Moline, Illinois.

Aerial View of Moline's New Pumping Station.



climax BLUE STREAK ENGINES

GUARD MOLINE'S WATER SUPPLY

Moline, a fast growing industrial city in Western Illinois, installed two Climax 12 cylinder and one 6 cylinder engines to guard their water supply. They are used as standby power for pump units during electrical power failures.

Selected because of their low upkeep expense, economy and their ability to provide quick dependable power to meet all emergency demands. Climax Engines have been approved and preferred by a growing number of municipal water works for standby service.

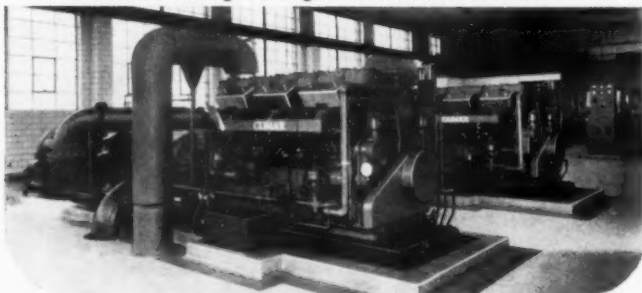
climax

ENGINE AND PUMP MFG. CO.

Factory and General Office: Clinton, Iowa

Regional Offices: Chicago, Ill., Dallas, Texas

For emergency use in water works Climax Engines are rated from 75 to 600 H.P. Sewage Gas Engines are rated from 50 to 250 H.P.



It's a fact . . . our handy Readers' Service card is the easy way to get new catalogs.



LEADERS IN THE PUBLIC WORKS FIELD



E. L. Schmidt is, we believe, the first engineer to be appointed Secretary of Highways for the Commonwealth of Pennsylvania. Long affiliated with highway planning, engineering and construction, Mr. Schmidt has been Chief Engineer of the Pennsylvania Department of Highways since 1947 and Acting Secretary since the death last November of the late Ray Smock, then the Secretary.

Mr. Schmidt was with Allegheny County, Pa., from 1916 to 1939, holding many important engineering posts. In 1939, he became Engineer for the Department in charge of the Pittsburgh District. Under his administration as Chief Engineer, the highway construction program has been the largest in the history of the state, averaging about 100 million dollars annually. Work has included such outstanding advances as the Penn-Lincoln Parkway in Pittsburgh and the Schuylkill Expressway in Philadelphia.

Well known in engineering circles, Mr. Schmidt is a member of the Pennsylvania Society of Professional Engineers, of the AASHTO, and of other engineering societies. He is married and resides with Mrs. Schmidt in Harrisburg, though they still retain their Pittsburgh home. We congratulate Mr. Schmidt on setting a new mark for engineers and for his many contributions to engineering and to engineering administration.

a **HEAVIER** refuse load
a **LIGHTER** budget load



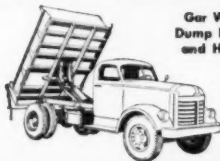
Gar Wood LOAD-PACKERS feature Hydraulic Compression

Because the Gar Wood Load-Packer collects a bigger, heavier load of refuse each trip, fewer trips are needed for your entire refuse collection. Add to this the very low maintenance and operating cost of the Load-Packer . . . the result is a substantial saving in your collection budget.

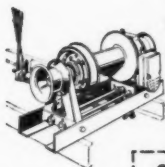
Hydraulic packing makes the Load-Packer hold far more. The low loading hopper makes loading

quick and easy, avoids spillage. The tightly closed body eliminates odor and fly nuisance. More than 1600 users (from the largest cities to small towns) have cut their refuse collection costs . . . and are doing a cleaner, more sanitary job with Gar Wood Load-Packers.

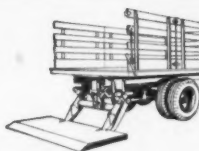
Use the coupon below to learn how collection costs are slashed . . . public health improved. Write now!



Gar Wood
Dump Bodies
and Hoists



Gar Wood
Winches



Gar Wood
Elevating
End-Gate

52-10



GAR WOOD INDUSTRIES, INC.

Wayne Division • EXECUTIVE OFFICES, WAYNE, MICHIGAN

TRUCK EQUIPMENT: Dump Truck Bodies & Hoists, Winches & Cranes, Refuse Collection Bodies, Elevating End-Gates. CONSTRUCTION EQUIPMENT: Excavators, Scrapers, Dozers, Ditchers, Spreaders, Finegraders, Truck-Mounted Road Graders

Gar Wood Industries, Inc.

Executive Offices, 36205 Main St., Wayne, Michigan

Please send me Bulletin M60 explaining the many advantages of Gar Wood Load-Packers. Also bulletins on other items checked:

☐ Dump Bodies

☐ Elevating End-Gate

☐ Winches

Name _____

Title _____

Address _____

Now's the time to mail this month's Readers' Service card.

Free EQUIPMENT DATA TO HELP YOUR PUBLIC WORKS PROGRAM

The engineering information in these helpful catalogs will aid you in Engineering and Public Works programs. Just circle numbers you want on the coupon or write the manufacturer direct and mention PUBLIC WORKS.

NEW LISTINGS

Bulletin Helps Pump Installation Design

103. Construction details, design, approximate dimensions and typical examples of performance of Economy double-suction centrifugal pumps will be found in 16-page Catalog A750, issued by Economy Pumps, Inc., Div. of C. H. Wheeler Mfg. Co., 19th and Lehigh, Philadelphia 22, Pa. This bulletin is profusely illustrated to show many types of pumps and methods of drive for water works service. Check coupon for your copy.

Surveying Instruments— Basic Tools for the Engineer

228. Be sure you get Bulletin 1052 of David White Co. when you need transits, levels and other top-quality surveyors gear. A full line of surveying instruments and accessories is described in their 42-page catalog. Get your copy by checking the coupon or write to David White Co., 315 W. Court St., Milwaukee 12, Wis.

Efficient Blowers for Activated Sludge Plants

232. Many advantages of Roots-Connorsville positive displacement rotary blowers are described in Bulletin 22-23-B-13, which also provides characteristic curves for operation with constant speed, multi-speed and variable speed motors and details of several types of blowers. Get this helpful bulletin by checking the coupon. Roots-Connorsville Blower Corp., Connorsville, Ind.

Light and Convenient Marker Paints All Types of Guide Lines

262. The "Mark Rite," a light-weight, easily operated marker for painting traffic lines, parking guides and other applications is described in a folder of Universal Mfg. and Sales Co., 5211 Pacific Blvd., Huntington Park, Calif. This simple, gravity feed unit applies any traffic paint or lacquer of standard quality. Check coupon for full details.

Attractive Bulletin Features Large Elevated Tanks

252. In a new 24-page booklet, "Horton Elevated Steel Tanks of Large Capacity," Chicago Bridge & Iron Co., Chicago 4, Ill., describes the advantages of using large elevated steel tanks to provide gravity pressure in municipal water systems. Detailed information on radial-cone tanks of 500,000 to 3,000,000-gal. capacity and Horton-spheroidal tanks of 1,000,000 to 3,000,000 gal. is included in this really handsome bulletin. Check coupon for your copy.

Effective Rat Control For Dumps

263. Rat infestations in public dumps can be effectively controlled with the weatherproof steel "Rat Cafeteria" offered by Solvitt Chemical Co., Inc., Speedway Road, Madison 5, Wis. Warfarin and bait are kept available for continuous feeding without wastage. Check coupon for full details.

Data on Mixers For Flocculation Tanks

265. Full data on Link-Belt Straightline mixers for flocculation tanks will be found in Folder No. 2042, issued by Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa. Layouts of typical tank arrangements are included. For your copy just check the coupon.

Water Conditioning Data Book Offered To Engineers

259. All engineers and municipal officials concerned with water conditioning will want a copy of the greatly enlarged edition of the popular Permitit Data Book prepared by the Permitit Co., 330 West 42nd St., New York

PUBLIC WORKS for May, 1952

18, N. Y. This completely revised book presents a compilation of 77 tables, all valuable to the engineer. Subjects include hydraulics, impurities in water, reactions and conversions of chemicals used in water treatment, alkalinity relationships and other helpful material.

New "Chromatron" Photoelectric Colorimeter and Turbidimeter

251. The Hellige "Chromatron" features selective color filters, square and round absorption tubes, hermetically sealed photocell and automatically focused bulb to permit analysis of water and sewage using Standard Methods or any other colorimetric procedure. Full information from Hellige, Inc., 3718 Northern Blvd., Long Island City 1, N. Y., by using the coupon.

Auxiliary Electric Power For Public Utilities

254. Full descriptive information on Onan electric plants for every public utility need will be found in Form A-292 issued by D. W. Onan & Sons, Inc., Minneapolis 14, Minn. Be sure you have latest data on standby plants and controls for emergency electric power. Check the coupon now.

Instruction Booklets Help Centrifugal Pump Users

257. Two instruction booklets covering the installation, operation and repair of its single-stage, single-suction and multi-stage centrifugal pumps have been released by Allis-Chalmers Mfg. Co., 1189 S. 70th St., Milwaukee 1, Wis. Recommendations are made for regular inspection and maintenance, and handy reference tables help the trouble shooter. Get your copies by checking the handy coupon.

Automatic Release Tongs Handle Pipe Faster

265. Pipe line handling equipment furnished by Superior Equipment Co., Bucyrus, Ohio, features automatic release pipe tongs for faster, easier and safer pipe handling, and related equipment including blade back fillers, angle push blades, pipe dollies, etc. Check coupon for full data.

MORE LISTINGS ON PAGES 28 TO 40

Clip

AND MAIL TODAY



READERS' SERVICE DEPT. PUBLIC WORKS MAGAZINE 310 East 45th Street, New York 17, N. Y.

Please send me the following literature listed in the Reader's Service Dept. of your May issue.

Booklets from pages 26-40:

20	21	23	24	25	33	35	39	40	41	43	44	46	48	50	53	54	55	61
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Name

Occupation

Street

City State

THIS COUPON NOT GOOD AFTER JUNE 30th, 1952



"You Can't Fool Me On Street Sweepers!"

"I've got to have efficiency and low operating and maintenance costs—that's why I selected MOBIL-SWEEPER," says Bill Heath, president of Wm. R. Heath Co., contract sweeper for municipalities and industrial plants.

When you're competing with all other sweeping methods and equipment on a "per hour" rate, the costs of operation are doubly important. Bill Heath of Inglewood, California, sweeps on contract for paving contractors, municipalities and industrial plants. He has owned and operated nearly every type of sweeper in recent years and he says—"Mobil-Sweeper is the best machine I've ever had. Speed in traveling to and from the sweeping area is vitally important in my cost records.

Mobil-Sweeper is outstanding in this department.

"Maintenance costs have been unbelievably low. That International engine is great—the sweeper design is properly engineered. Gutter broom and rear broom are easy to adjust, and I get long wear on both. The dirt hopper always fills to capacity—something I check because it costs me money to stop too often. For my money—and I do mean my money—Mobil-Sweeper is the best buy on the market!"

Write today for literature telling how you can cut your sweeping costs.



TWO GUTTER BROOM MODEL WITH DUAL DRIVING CONTROLS

MOBIL-SWEEPER

DIVISION OF
THE CONVEYOR CO.
3260 E. SLAUSON AVENUE
LOS ANGELES 58, CALIF.

THE CONVEYOR COMPANY

3260 East Slauson Avenue, Los Angeles 58, Calif.

Gentlemen:

Please send catalog with complete details and specifications for the Mobil-Sweeper.

Name _____ Title _____

Address _____ City _____

County _____ State _____



PW-16

New products . . . mail your Readers' Service card today.

Cost Data For Soil Compaction

266. Cost data for soil compaction with the Barco Rammer in restricted areas has been compiled from a survey on construction jobs. All direct costs are itemized and discussed in this interesting technical bulletin. For a copy, check the coupon or write to Barco Mfg. Co., 1801 Winnemac Ave., Chicago 40, Ill.

Instruction in All Branches of Civil Engineering

267. All the varied branches of the civil engineering profession are subjects of courses of the International Correspondence Schools, Scranton, Pa. An attractive 62-page book is available which discusses the civil engineering field and outlines many courses of instruction. Just check the coupon today.

Root-Proof Fittings For Orangeburg Pipe

269. 3/4" and 1 1/4" bends and wyes that fit all makes of bituminized-fibre pipe are available in 4" size. Fittings have tapered joints which require no compound—a tap or two makes a root-proof joint. Write Dept. PW, Orangeburg Mfg. Co., Inc., Orangeburg, N. Y., or check the coupon.

Reflective Traffic Lines For Night Visibility

270. Highway center lines and pavement markings striped with Prismo Lifeline have high visibility for safety 24 hours a day. An attractive bulletin, No. 461 fully describes the Prismo system, gives the results of durability tests and shows how easily the Prismo spheres can be applied. Check coupon or write Prismo Safety Corp., Dept. PW, Huntington, Pa.

Gas-Diesel Engines for Low Cost Municipal Power

283. Be sure to get the latest catalogs on Cooper-Bessemer gas-diesel engines for dependable, low cost electric power in your city. Full details are available by writing to the

Cooper-Bessemer Corp., Mt. Vernon, Ohio, or just check the handy coupon.

For Fast, Smooth Pipe Cuts

235. The Wachs National air-powered pipe saw makes fast, accurate cuts in cast iron or steel pipe from 10" to 48" dia., leaving clean-cut milled edges. Get full information on this unit from E. H. Wachs Co., 1525 N. Dayton St., Chicago 22, Ill. by using the coupon.

Helpful Valve Catalog For Engineers

236. For complete descriptions of Darling double disc, parallel seat gate valves be sure to get Bulletin 5002 issued by Darling Valve & Mfg. Co., Williamsport, Pa. Construction details covering all valve parts and accessories are helpful for specification writers. Check the coupon for your copy.



Sound Film Shows Sewer Cleaning During 1951 Flood Disaster

250. A sound film tracing the work done during the disastrous 1951 flood in Kansas City by Ace Pipe Cleaning Contractors, Inc., 2003 Indiana, Kansas City, Mo., is available to city officials without charge. Check the coupon for full details on how you can secure this professionally prepared film showing complicated sewer main cleaning operations.

What You Should Know About Warfarin for Rat Control

284. An interesting booklet prepared by the Prentiss Drug and Chemical Co., 110 William St., New York 38, N. Y., tells how Warfarin, the proven rodenticide, kills rats. Directions for effective use, questions and

answers and reports from users are included. Check coupon for copy.

Have You Investigated Parking Meters?

274. The latest features of metered parking for curb and off-street areas, including simple change of time period, coin acceptance and automatic, long-life operation are described in new bulletins offered by the Dual Parking Meter Co., Canton 2, Ohio. Check the coupon for your copies.

Solving Hauling and Lifting Problems

286. Handling pipe, hydrants and valves; form pulling; equipment lifting; and many other jobs that require a light-weight, economical crane can be solved with the versatile Pitman Hydra-Lift, an inexpensive crane that fits on the frame of any truck, 1 1/2 tons or larger. Full data by checking the coupon. Pitman Mfg. Co., 300 W. 79th Terr., Kansas City, Mo.

STREETS AND HIGHWAYS

How the Mobil-Sweeper

Can Improve Street Sweeping

23. Sweeping costs can be cut with the new Mobil-Sweeper which features safe highway speeds up to 55 mph, carries 2 2/3 cu. yd. dirt hopper, sweeps swath up to 10' wide with full floating brooms. Hills and deep gutters are no obstacle. Write to The Conveyor Co., 3260 E. Slauson Ave., Los Angeles 58, Calif. or use coupon for complete details on this machine.

Do You Have Complete

Black Top Equipment Data?

41. In 36-page catalog AA a full line of equipment for black top road construction and maintenance is covered. Units described and illustrated include several models of pressure distributors, supply tanks, sprayers, brooms, asphalt kettles, portable rollers, and accessory tools. Use coupon for copy of this handy manual. Littlefield Bros., 452 E. Pearl St., Cincinnati 2, Ohio.



UNIVERSAL CONCRETE PIPE CO. PLANTS

Decatur, Ala.
Dothan, Ala.
Tampa, Fla.
Atlanta, Ga.
Kenvil, N. J.
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UNIVERSAL AFFILIATES—
Concrete Pipe Co. of Ohio
with plants in Cleveland,
Youngstown and Sandusky,
Ohio and Erie, Pa.; Florida
Concrete Pipe Co., Ocala,
Fla.; Dixie Concrete Pipe
Co., Louisville, Ky.

DRAINAGE PROBLEMS on Defense Projects handled faster with **UNIVERSAL** MOBILE SITE-CAST EQUIPMENT

Drainage problems won't hold up your defense project if you'll (1) rely on one of Universal's 23 "local" plants to supply you with all your pipe needs, or (2) call in Universal to make the pipe right on the job, using MOBILE pipe-making equipment.

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The principle of the superiority of SEAMAN-mixing is in the blending of all materials so uniformly that the strongest, highest load-bearing, wear and weather-resistant base is produced. Add to this the high daily output of mixed materials, the remarkably low operating cost and the small purchase investment required — and you will see why the SEAMAN is building more miles of better roads for the tax-dollar — than is possible with any other method of mixing. So it's your move. Make it a winner — with the SEAMAN MIXER.

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How to Beat**The Weed Problem**

66. Be sure to investigate weed control with selective chemical weed killers that get roots and all. Send in coupon today for bulletins on Dolge products that will rid roadsides, parks and lawns of the weed nuisance. C. B. Dolge Co., Dept. PW, Westport, Conn.

Grading Can Be Faster, Cheaper and Easier

96. You'll like every feature of the Austin-Western 99H Grader. It has all-wheel drive, all-wheel steer, controlled traction, precision sideshift and a high lift, extreme reach, reversible blade. Get data from Austin-Western Co., Aurora, Ill.

Salt Stockpiling Allows Economical Buying

133. With inexpensive "Rayn-Shed" covers you can buy rock salt in economical quantities and stockpile it for winter use. Check coupon

now to get data sheet for estimating sizes of Rayn-Shed covers for your storage requirements. Cayuga Rock Salt Co., Inc., Myers, N. Y.

Helpful Bulletin**Shows Roadbuilding Methods**

141. Laying base or surface aggregates, tree-flowing hot or cold bituminous mixtures and plant-mixed stabilized soil with the Jaeger paver type aggregate spreader are described and illustrated in Catalog SPS-1. Get data on this variety of roadbuilding methods and full specifications by checking the coupon. Jaeger Machine Co., 400 West Spring St., Columbus 16, Ohio.

How to Save Time on Curb and Gutter Work

143. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept., PW, Warren, Ohio.

Aerial Surveys and**Maps from Photographs**

53. Written in non-technical language, a 16-page booklet with this title gives a complete explanation of aerial surveys for the municipal field. Interesting step-by-step pictures show how planimetric and topographic maps, mosaics and atlas sheets are produced by Abrams Aerial Survey Corp., Lansing 1, Mich. Check the coupon for your copy.

Black-Top Paver**Offers Many Advantages**

150. The flexible Adnurn Black Top Paver lays any asphalt mix, hot or cold, in widths from 6 ft. to 13 ft. Careful design lowers operating cost and cuts maintenance. Attachments spread stone, cinders or slag. Get full data on this machine by checking coupon. The Foote Co., 1954 State St., Nunda, N. Y.

Case Histories of**Sidewalk Resurfacing**

170. A very interesting brochure dealing with sidewalk resurfacing and waterproofing shows how easily-applied "Plastic Rock" asphaltic concrete results in an attractive, non-skid wearing surface. Use the coupon for full information. United Laboratories, Inc., 16801 Euclid Ave., Cleveland 12, Ohio.

Your Property is Worth Good Protection

176. When installing link fence you want protection against rust and corrosion as well as vandalism. Investigate chain link fence made of "Konik" metal described in "Planned Protection" published by Continental Steel Corp., Kokomo, Ind.

Valuable Booklet**Tells Soil Stabilization Facts**

206. All forms of soil stabilization, using any type of binder with any suitable aggregate, are covered in "Soil Stabilization Methods," Bulletin 25 published by Seaman Motors, Inc., Milwaukee 3, Wis. Get this valuable booklet for complete information on processing methods and the many uses of the Seaman Pulvi-Mixer by checking the coupon.

Permanent Street Signs**Cut Maintenance Costs**

218. Permanent cast aluminum street signs and markers of all types are described in a 20-page illustrated bulletin available from Lake Shore Markers, 654 W. 19th St., Erie, Pa. Get full information on these distinctive markers, available in plain or reflectorized finish, by checking the coupon.

Investigate "Super Seal"**For Blacktop Surfaces**

222. Appearance and wearing qualities of all blacktop surfaces may be improved with an application of "Super Seal", a weather and solvent-proof emulsion with a coal tar base. Be sure to investigate this easily-applied material that puts a smooth, tough finish on pavements and parking areas. Full details from Troyer Driveway Service, 2157 South Park Ave., Buffalo 20, N. Y. Check the handy coupon.

Helpful Data on Distributors**For Bituminous Materials**

240. Two models of pressure distributors featuring uniform pressure and temperature, accurate displacement pouring and fast loading are covered in Bulletins RS 31549 and RS 12046, available from Standard Steel Works, Dept. PW, North Kansas City, Mo. Check the coupon to request your copies.



When it comes to faithful water treating service, %Proportioneers% "Little Red Pump" is still in a class by itself. The Heavy Duty Midget Chlor-O-Feeder has many unique features that pay off in long, trouble-free service:

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Minimum of moving parts, all easily accessible.

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SEWERAGE AND WASTE TREATMENT**What You Should Know About****Trickling Filter Underdrains**

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, % Editor, Public Works, 310 E. 43th St., New York 17, N. Y. Check the coupon and we will forward your request.

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On its new 10-mile water supply line Miami, Florida demanded 1. *Long Life*, 2. *Sustained high carrying capacity*, 3. *Great structural strength*. Only in Concrete Pressure Pipe could they get all three.

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Valuable Booklet on Porous Diffuser Plates and Tubes

21. A helpful 20-page booklet published by the Norton Co. is a complete guide for the selection of porous media for installation in activated sludge plants. Full data for the designing engineer is provided by careful detailing of physical characteristics of plates and tubes. Maintenance of porous media also is discussed at some length. For your copy of Form 1246, write to the Norton Co., Dept. PW, Worcester 6, Mass., or use the coupon.

How Cities Clean Sewer Lines From Street in One Operation

25. In a helpful 28-page handbook of sewer cleaning methods and equipment the makers of OK Champion sewer cleaners give full details of power and hand operated models. Also included are data on expansion buckets that take dirt from sewer to street in one operation, root cutters and other accessories. Get your copy by checking coupon. Champion Corp., 4752 Sheffield Ave., Hammond, Ind.

Concrete Saw Cuts Smooth, Straight Edges

35. When the sides of patches and trenches are saved before breaking, a saving of 25% in removal costs is claimed. And the smooth, straight edges won't spall or crack after replacement material is poured. Investigate the exclusive features that give maximum economy to Clipper concrete saws. Full information from Clipper Mfg. Co., 2823 S. Warwick, Kansas City 8, Mo., or check the handy coupon.

Construction and Engineering Service For Water and Waste Systems

97. In addition to their nationally-known water and sewer system rehabilitation services, the Pittsburgh Pipe Cleaner Co., 133 Dahlem St., Pittsburgh 6, Pa., is now prepared to furnish complete engineering and construction service, including surveys, tests, design and construction. A full and concise description of these services will be found in an attractive new folder. Get your copy by checking coupon.

A Handbook of Sewer Cleaning Equipment and Methods

46. A new, fully illustrated 40-page booklet shows every sewer cleaning operation with "Flexible" tools. Includes data on the fast and easily operated new SewerRoder and full engineers' specifications for power bucket machines. For your copy write Flexible Sewer Rod Equipment Co., 9059 Venice Blvd., Los Angeles 34, Calif.

How You Can Dispose Of Sewage Solids

54. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Dept. PW, Nichols Engineering and Research Corp., 70 Pine St., New York 5, N. Y.

How to Dig Low Cost Trench Under All Conditions

61. The Barber-Greene Runabout ditcher features hydraulic control of crowding speed, independent of bucket line speed, to provide maximum digging efficiency under all soil conditions. One-man operation and mobility from job to job result in trenching at the lowest cost. Get Bulletin 705-A now for full details on this money-saving machine. Barber-Greene, Aurora, Ill.

Helpful Installation Manual For Drainage Structures

62. A 46-page manual, well worth careful study by designers and field engineers dealing with drainage structures, culverts, sewers or conduits, is offered by Armo Drainage & Metal Products, Inc., Middletown, Ohio. Proper location of the structures, base preparation, assembly and backfill are some of the many items covered in detail. Use the handy coupon for free copy.

Specifications for Jointing Reinforced Concrete Pipe

63. Engineering specifications for use of Hexseal rubber gaskets with reinforced concrete sewer pipe are contained in a new brochure published by Universal Concrete Pipe Co., Dept. PW, 297 S. High St., Columbus, Ohio. Subjects include dimensions, pipe design, reinforcement, curbing and jointing instructions. Get your copy by checking the

End Root Problems

With Root-Proof Sewers

107. Troubles caused by roots and corrosion in house connections can be eliminated by the use of root-proof Hermos sewer pipe. Full details on this smooth, waterproof, tight-sealing pipe available by checking the coupon, or write to the Brown Co. Dept. PW, 150 Causeway St., Boston 14, Mass.

Designing Grit Chambers?

Here's What You Should Know

113. A helpful bulletin filled with drawings of typical designs, operating data, clearly written text outlining the principles of grit chamber design and requirements for removal of grit free from organics is offered by the Dorr Company. Get your copy of Bulletin 6411 on the Dorr "Detritor" by checking the coupon or from The Dorr Co., Barry Pl., Stamford, Conn.

Data on Rotary Distributors

For Sewage Treatment

118. Data on Inflico rotary distributors which feature low head requirements, uniform distribution, streamline design, double seal against sewage loss, and corrosion resistant construction, will be found in Bulletin 6400. For your copy, use the handy coupon or write Inflico Inc., Box 5033, Tucson, Ariz.

Durable Gratings and Treads

Are a Good Investment

147. Gratings for walks around settling tanks and other parts of treatment plants, both out-doors and in, for stairways, floors and balconies, are described in an illustrated 16-page bulletin by Irving Subway Grating Co., 50-53 27th St., Long Island City 1, N. Y.

Comminutors for Automatic

Disposal of Coarse Sewage Solids

152. The problems connected with disposal of coarse sewage solids are eliminated by clean, odorless, automatic Commiunutors. Full engineering data show the proper model for every size plant and furnish details of hydraulics and typical installations. Chicago Pump Co., 2348 Wolfram St., Chicago 18, Ill.



SEE YOUR PROBLEMS—SEE THE ANSWERS
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PRESENT YOUR PLAN FORCEFULLY

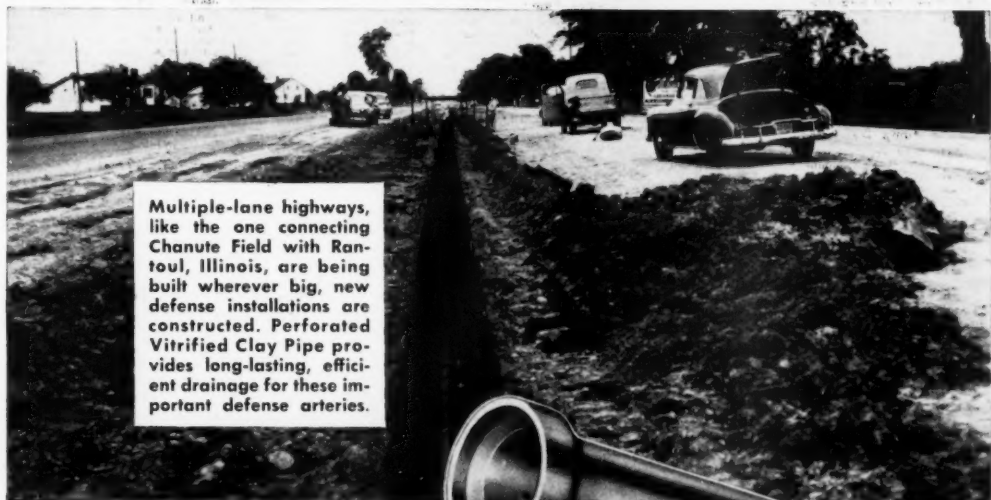
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Multiple-lane highways, like the one connecting Chanute Field with Rantoul, Illinois, are being built wherever big, new defense installations are constructed. Perforated Vitrified Clay Pipe provides long-lasting, efficient drainage for these important defense arteries.

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Low Cost Power From Dual Fuel Engines

154. Operating on the Diesel cycle, burning either oil or gas, the Worthington Supercharged Dual Fuel Diesels give high economies by running on the cheapest fuel available. Get complete data from Worthington Corp., Dept. PW, Harrison, N. J.

Non-Clogging Vertical Wet-Pit Pump Described

162. Full engineering data on Worthington "Freeflo" wet-pit pumps with non-clogging impellers capable of passing solids and stringy material are included in Bulletin W-317-B12. Check these pumps for sump, sewage and drainage service. Bulletin available from Worthington Corp., Harrison, N. J. Just use the coupon.

Design Data for Insulated Piping

168. For all jobs where insulated piping is required you will want full design data on Ric-wil. Prefabricated Insulated Piping. Get 28-page catalog from the Ric-wil Co., Cleveland, Ohio, for details on both underground and overhead lines.

How Vacuum Filters Help Your Sewage Sludge Disposal

309. Applications of the Conkey sludge filter to all types of sewage sludge are described in Bulletin 100. Tables show filter sizes, weights, and give anticipated average results. Use the coupon to order your copy. General American Transportation Corp., Process Equip. Div., New York 17, N. Y.

How to Dispose of Sewage and Industrial Sludges

281. Get full information on the C. E. Raymond System of combined incineration and sludge drying providing high temperature deodorizing for nuisance-free sludge disposal. Flexible layouts fit large and small communities. Use handy coupon or write Combustion Engineering-Superheater, Inc., Flash Dryer Div., 200 Madison Ave., New York 16, N. Y.

Complete Data On Sludge Pumps

193. Sludge pumps, simplex, duplex, triplex and quadruplex, normal and heavy duty models, are described in Bulletin S48 issued by Marlow Pumps, Ridgewood, N. J. Check the handy coupon for your free copy.

Book Tells How to Control Root Stoppages

249. Details on the proven use of copper sulfate to control root and fungous growths in sewers are contained in a brand-new book published by Phelps Dodge Refining Co., 40 Waj St., New York 5, N. Y.

CONSTRUCTION EQUIPMENT AND MATERIALS

What's Your Digging Problem? Repair Work? Trenches? Footings?

35. At today's prices, hand digging means the job will be costly. You can dig through asphalt and macadam, work fast and efficiently even in cramped areas with the tractor mounted Sherman Power Digger. From one position you can reach to dig 10 feet behind tractor in 140° arc and to depth of 8 feet. For full details check the coupon. Sherman Products, Inc., Royal Oak, Mich.

Your Dump Truck As a Complete Working Unit

39. The addition of a Holmes-Owen Loader to four dump truck converts it into a complete digging and loading unit that enables one man to load, haul and dump. Illustrated folder shows how this self-loading unit with hydraulic crowding action can be a real time and labor saver for the municipality or contractor. Check the handy coupon for full data. Ernest Holmes Co., Chattanooga, Tenn.

Compact "Auto-Air" Compressor Eliminates Second Engine

46. A second engine is eliminated by the Davey "Auto-Air" compressor, which is powered by a power takeoff on the truck drive shaft. Compact design permits utilization of remainder of truck body space for transportation of men, tools and materials. Be sure to investigate this efficient compressor that lets one truck do the work of two. Davey Compressor Co., Kent, Ohio.

Cartoon-Style Booklet Shows Motor Grader Operation

48. In a 4-color handbook for motor grader operators the adjustments and techniques for a wide range of grader jobs are explained with cartoon-style illustrations and clearly-worded text. Every grader operator should see this educational piece. Form 30228, available from Caterpillar Tractor Co., Peoria 8 Ill. Check the coupon for yours.

How to Keep Your Loader On the Job

50. Don't take more time to move your loader to the job than to do the work. Investigate the Eagle Truck Mounted Loader for handling gravel, sand, cinders, snow from windrows or piles. Get forms 444 and 947 from Eagle Crusher Co., Inc., Dept. PW, Galion, Ohio.

Safety Lantern With Pencil Beam Signal

77. Get information on the Dietz "Night Watch" Safety Lantern with special globe design that saves fuel by intensifying light rays into a pencil beam. Full details available from R. E. Dietz Co., Syracuse, N. Y. Just check the handy coupon.

Air Cooled Engines for Hundreds of Applications

137. Tested under severest conditions of long, hard use, these engines have earned world wide recognition as the "right" power of hundreds of applications. Get latest bulletin from Dept. PW, Briggs and Stratton Corp., Milwaukee 1, Wisc.

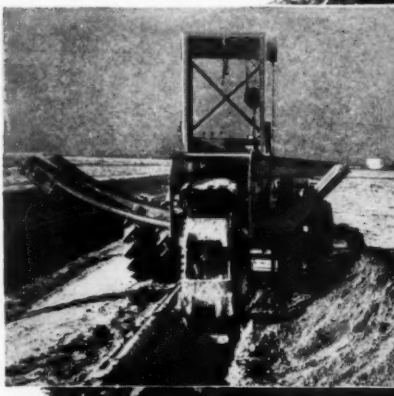
DIG CLEANER TRENCHES...FASTER...with a

BE-GE Hydraspeed TRENCHER

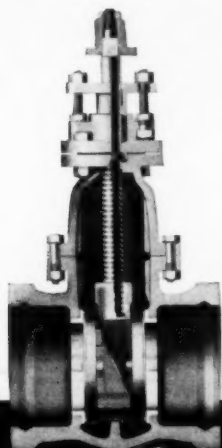
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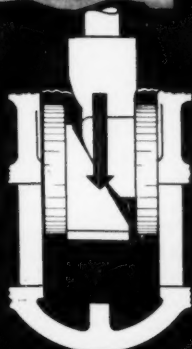


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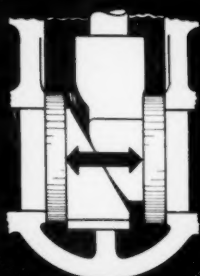


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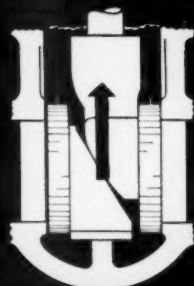
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SKINNER-SEAL
Bell Joint Clamp for stopping bell and spigot joint leaks under pressure. Gasket is completely sealed; at bell face by Monel Metal Seal band—at spigot by hard vulcanized gasket tip.

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Municipalities Make Equipment Dollars Go Further

55. Be sure to get your copy of "Saving Facts," a new illustrated booklet prepared by The Oliver Corp. that shows how equipment dollars can be stretched on municipal work. Text and photos describe the application of tractors and money-saving attachments in street maintenance, snow removal, waste disposal, pipe laying and other projects. Write The Oliver Corp., Industrial Div., 19300 Euclid Ave.,

Tractors for Counties, Cities and Contractors

76. An attractive 24-page catalog portrays the Allis-Chalmers HD-5 crawler's abundant capacity and ability to meet the variable needs of counties, townships and contractors. Photographs and cutaway views illustrate its rugged construction and simplified maintenance. Use coupon or write Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wis.

Self-Powered Paving Breaker Requires No Compressor

72. Low initial cost and low operating cost are big reasons why you should investigate the new, powerful Syntren gasoline paving breaker. No compressor, hose, cables or battery boxes are needed with these self-contained, heavy-duty machines. They will cut, bust, dig and tamp. Get details from Syntren Co., Dept. PW, Homer City, Pa. by checking the coupon.

3 to 5 Ton Tandem Roller Has Many Uses

84. The Gallion Iron Works & Mfg. Co., Galion, Ohio, has just issued a catalog on their new model 3-5 ton Variable Weight Tandem Roller. The many improvements in construction and operation are fully described and illustrated. Get your copy of Catalog 360 by checking the coupon.

Examining a Tractor Piece by Piece

99. The new 32-page catalog published by International Harvester Company should be studied by every tractor owner, for in it each unit from engine to track of the TD-9 Diesel is considered separately. These piece by piece discussions are supplemented by notes on easy servicing, versatile applications and attachments for every need. Get your copy of form CK-113-A from International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill., or check the handy coupon.

Special Pumps to Fit Any Dewatering Job

101. Centrifugal Pumps. Long lasting, self-priming, non-clogging pumps for quickly dewatering trenches and similar construction jobs. Ask for Bulletin F-LV-13, Gorman-Rupp Co., 320 No. Bowman St., Mansfield, Ohio.

Helpful Booklet on Carryable Centrifugal Pumps

129. A booklet prepared to give practical information that will guide you in choosing the best type of pump for your requirements is offered by the Homelite Corp. Both gasoline and electric models are discussed, and requirements outlined for many applications. Just check the coupon for your copy. The Homelite Corp., 2125 Riverdale Ave., Port Chester, N. Y.

Three-Wheel Roller For General Purpose Duty

142. A new 20-page bulletin describing general purpose 3-wheel rollers covers 8, 10, 12 and 14-ton gasoline and diesel models of the Huber line. Illustrations and comprehensive explanation show component parts of the rollers and describe the general duties of the rollers. For your copy of this attractive bulletin, No. H-150, write the Huber Mfg. Co., Marion, Ohio, or use the coupon.

Profitable Construction with Payloader

234. A comprehensive, 12-page catalog filled with on-the-job photos showing a wide variety of earth-moving, material-handling, lifting and carrying jobs being performed by the multi-purpose tractor-shovels known as "Payloaders" is now available. Helpful job data, specifications and features of the complete Payloader line are included, with illustrations of useful accessories. Copies of this colorful catalog No. 217 can be obtained from The Frank G. Hough Co., 761 Sunnyside Ave., Libertyville, Ill., or by checking the coupon.

Helpful "How To Use" Section Aids Roller Selection

195. In addition to specifications and illustrations of roller operation, the new Buffalo-Springfield catalog features a special section to help in the selection of the right roller model for the job. Be sure you get top results from your roller selection by checking this helpful material. Use the coupon for a copy. Buffalo-Springfield Roller Co., Dept. PW Springfield, Ohio.

Trenching Made Easy With Hydraulic Dragshovel

216. The Bucyrus-Erie "Hydro-hoe," a completely hydraulic dragshovel has two separate digging actions to dig a level, scallop-free trench and greatly reduce hand trimming. Be sure to investigate this rugged, easily operated machine. For details write Bucyrus-Erie, Hydrocrane Div., So. Milwaukee, Wis., or check the handy coupon.

Handbook of Castings

For All Public Works Construction

220. Every type of construction casting needed by engineers and contractors in the public works field will be found in a 136-page catalog issued by Neenah Foundry Co., Neenah, Wis. Detailed illustrations and complete tables of dimensions will help the designer and materials buyer. Get your copy of this valuable catalog by checking the coupon today.

Get Tough Blades and Cutting Edges For Your Construction Equipment

221. Controlled analysis steels used in Shunk blades and cutting edges for graders, scrapers, dozers, and snow plows means long life and wear resistance to give you more value for your maintenance dollar. Full data for ordering blades and scarifier teeth for standard and special equipment is available from Shunk Mfg. Co., Bucyrus, Ohio. Check the coupon today.

Gunite Costs Less

On Repair Jobs

255. Be sure to investigate Gunite for repair of reservoirs, dams, water and sewage plant tanks, sewers, swimming pools, etc. Contact Eastern Gunite Co., Elkins Park, Pa. for full information, or use coupon.

Choosing Trucks

For Municipal Service

264. For all municipal services, trucks are needed that are high in efficiency and economy. Be sure to investigate the White 3000, engineered for high performance. Full details on White Super Power trucks from the White Motor Company, Cleveland 1, Ohio.

PEST CONTROL

Latest Information

On Effective Insecticides

198. Complete information on proper application and formulations of Chlordane and other effective insecticides for fly and mosquito control is available from the Veliscol Corp., 330 E. Grand Ave., Chicago 11, Ill.

WATER WORKS

How to Keep Trenching Jobs on Schedule

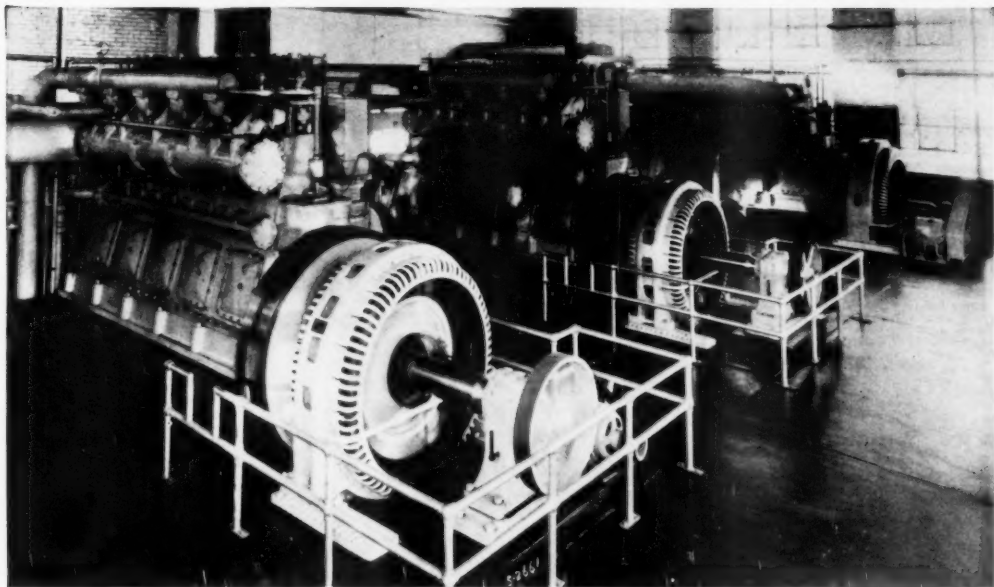
24. The easy maneuverability of the tough, compact Cleveland Model 95 "Baby Digger" makes it well suited for the difficult job of trenching past the many obstacles of city and suburban work. Multiple digging and crawler speeds handle all soil types and trench widths up to 24". Get Bulletin S-52 from Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio.

Is Your City

Metered 100%

33. 100% metering as practiced by many cities requires accurate, dependable meters with interchangeable parts. Cut-away views of every part, capacity and size data are all included

To order these helpful booklets check the coupon on page 26.



ENGINES IN FOREGROUND ARE ORIGINAL UNITS installed in 1939. Background engine is the latest supercharged unit installed in 1950. Another supercharged unit, placed in service in 1947, is not

shown in this view. The output of this plant has increased from 952,600 kw hrs for the first year to 3,792,900 kw hrs for the year ending December 31, 1951.

Power plant is financial asset for city of Odessa, Missouri

PROFIT used to pave streets, pay off water and sewage bonds, operate water department, and to pay for power plant itself.

Odessa, Missouri, is an agricultural trading center 38 miles east of Kansas City.

In 1939 the town took a big step—they started operation of a power plant that has since provided the small part-farm, part-suburban community with continuous, dependable, economical power. And equally important, it brought new income that did more than pay for power plant operation.

It also helped pave the streets, pay off water and sewage bonds,

and is paying off the cost of the new plant itself.

In spite of the high profitability of plant operation, rates have been lowered twice, and are today as low as can be found anywhere in the state.

Much of the credit for the success of the plant goes to the high operating efficiency of the four Worthington Diesels. After the two original units had been in service about eight years, the first supercharged engine was installed

in 1947. An additional supercharged unit was placed in service in 1950. Present output of the plant is 13.5 kw hrs per gallon with a load factor of 69.5%. The two supercharged engines—at this same load factor—averaged 14.0 kw hrs per gallon.

If you are interested in learning more about how modern Diesels, dual fuel, or high compression gas engines can help you reduce your power bills, write to Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Engine Division, Buffalo, New York.

E 2.3

Worthington-Built Auxiliaries



ENGINE STARTING COMPRESSORS



OIL TRANSFER PUMPS



COOLING WATER CIRCULATING PUMPS



EVAPORATIVE-TYPE ENGINE WATER COOLERS

Economical Continuous Power—Diesel Engines, 150 to 2,640 hp . . . Gas Engines, 190 to 2,880 hp . . . Dual Fuel Engines, 150 to 2,640 hp.

WORTHINGTON

Engines

in handsome American-Niagara water meter booklet available from Buffalo Meter Co., 2920 Main St., Buffalo 14, N. Y.

Seven Advantages of Prestressed Concrete Steel-Cylinder Pipe

43. All the things you want in water supply lines: permanency, structural strength, high carrying capacity, easy tapping, design flexibility, easy installation and economy are claimed for Prestressed Concrete Steel-Cylinder Pipe made by Price Brothers Co., 1932 East Monument Ave., Dayton 1, Ohio. Get full details by checking the coupon.

Engineering Data on Diatomite Filters

44. Detailed information and typical plans of Sparkier diatomite filters for swimming pools of municipal water systems is available to engineers and municipal officials. These filters feature self-cleaning filter elements which cuts wash water to a minimum. Get this material now by using coupon. Sparkier Manufacturing Co., Mundelein, Ill.

Efficient Coagulation With Ferri-Floc

69. Advantages claimed for Ferri-Floc as a coagulant include wide pH range, quick floc formation, manganese removal, control of certain tastes and odors, plus other aids in high quality water production. Check coupon for complete Ferri-Floc data. Tennessee Corp., Grant Bldg., Atlanta, Ga.

96 Page Book Helps Solve Water Problems

71. pH and Chlorine Control. A discussion of pH control and description of comparators, chlorimeters and similar devices. A 96 page booklet. W. A. Taylor & Co., 7304 York Road, Baltimore 4, Md.

Reference Catalog for Valves, Fittings and Hydrants

72. A complete line of gate valves for all services, standard flanged and screwed fittings, and the Kennedy "Safetop" fire hydrants are fully described in Catalog 63 of The Kennedy

PUBLIC WORKS for May, 1952

Valve Mfg. Co., Elmira, N. Y. All engineers who specify valves, fittings and hydrants should have this valuable catalog for ready reference. Check the coupon.

Factors to Consider in Elevated Tank Selection

80. An interesting discussion of the factors to be considered for selection of elevated capacities and sizes, required fire flows and other useful data are included in a bulletin on elevated water storage published by Pittsburgh-Des Moines Steel Co., Neville Island P. O., Pittsburgh 25, Pa.

Smaller Diameter Water Lines Cement Lining for

89. Water lines from 4" to 12" diameter are now cement-lined in place by Centriline Corp., using the Fute process. Catalog C-50 tells how this operation gives new pipe performance to old lines, and shows just how the work is done. An interesting folder, well worth studying. Check coupon for your copy. Centriline Corp., 140 Cedar St., New York 6, N. Y.

Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves is contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., 200 Elbut Street, Fairfield, Conn.

Tested Jointing Materials

102. "Hydrotite" is a self-caulking, self-sealing joint compound for bell and spigot pipes. For data book and sample write Hydraulic Development Corp., 50 Church St., New York, N. Y.

Pressure Pipe That Retains Capacity

106. Several bulletins describing the construction of pressure pipe, list of installations, carrying capacity tests, making service connections under pressure; and detail descriptions of several installations. Lock Joint Pipe Co., Box 269, East Orange, N. J.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Pipe Detector Determines Exact Location and Depth

120. Determination of the exact location and depth of buried pipes, valves, service cables and other metallic objects can save costly digging and unnecessary damage. Your work can be speeded when you use the Detectron pipe detector, which features simple operation, shielding to avoid static interference, economical unit construction and a lifetime guarantee. Get full data from Detectron Co., 3631 Cahunga Blvd., No. Hollywood, Calif., by using the coupon.

How Accurate Boring Speeds Underground Pipe Installations

135. Interesting charts showing earth boring costs, speed and accuracy for holes from 2 1/2" to 14 1/2" diameter and up to 80 feet long are included in 16-page Catalog No. 8 issued by Hydrauger Corp., 681 Market St., San Francisco 5, Calif. Specifications and general operating instructions are also covered.

Easily Cleaned, Long Run Filter Bed Media

140. Bulletin on Anthrafit tell the reasons why selected, graded crushed anthracite is superior to stand as a filtering material. Have you made a full investigation. Write Anthracite Equipment Corp., Wilkes-Barre, Pa.

Pollution-Proof Outdoor Drinking Fountain

144. A new outdoor drinking fountain so designed that contamination by cross connections or back siphonage is not possible is fully described in a 4-page bulletin. Features neat appearance, easy installation. Write Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati 2, Ohio, or use coupon.



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Infilco's BIOSORPTION PROCESS and the AERO-ACCELATOR.

The BIOSORPTION PROCESS has shown phenomenal results in the reduction of B.O.D. and suspended solids. So also are the results in efficiency, low maintenance and appreciable space-savings. The advantages of the AERO-ACCELATOR as a combined mixer-clarifier have been proved in many diversified installations. Together these two form a winning team.

Ask for bulletins describing Infilco's BIOSORPTION PROCESS and the AERO-ACCELATOR. See how the combination of these two can pay out handsomely.



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FIELD ENGINEERING OFFICES IN 34 PRINCIPAL CITIES

World's Leading Manufacturers of Water Conditioning and Waste Treating Equipment

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The **DEMPSTER DUMPSTER**® Rubbish Collection System

Eliminates Re-Handling Of Trash and Rubbish



Dempster-Dumpster Detachable Containers are spotted at business establishments, market areas, schools, etc. and loaded by the user. One truck-mounted Dempster-Dumpster, with only one man, the driver, picks up, hauls and empties, one after another, a multiple number of these containers . . . eliminating re-handling of refuse. Container sizes range up to more than three times the capacity of the average dump truck body. For low cost, efficient and sanitary bulk rubbish collection, your city needs the Dempster-Dumpster System. Manufactured exclusively by Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers
 . . . All Designs . . . All Sizes



THREE STAGES of quick pick-up, hauling and dumping are shown while Dempster-Dumpster is at work in Baltimore.

DEMPSTER BROTHERS, 952 Dempster Building, Knoxville 17, Tennessee

It's a fact . . . our handy Readers' Service card is the easy way to get new catalogs.

Faster Pipe Laying With Precalculated and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precalculated bell and spigot pipe are described in folder WM-47. Additional data on 2" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

Helpful Book Gives Pipe Flow

159. This handy 40-page pocket size book titled "Measurement of Water Flow Through Pipe Orifice with Free Discharge" explains the Layne pipe orifice meter method of computing water flow. Includes flow graphs for various size pipes. Layne & Bowler, Inc., Box 213, Hollywood Station, Memphis 8, Tenn.

Helpful Data on

Corporation Stops

161. A complete line of brass goods for water works: corporation stops, curb stops, service pipe couplings, goosenecks and other fittings are illustrated and described in catalog W-39, issued by A. Y. McDonald Mfg. Co., Dubuque, Iowa. Get your copy for ready reference.

What You Should Know About

Meter Setting and Testing Equipment

166. Complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of this book. Write for Catalog No. 50.

Chemical Feed Pump

For Chlorinating and Fluoridation

167. For complete data on a heavy duty, positive displacement, diaphragm type pump for accurate feeding, chlorinating and fluoridation solutions, get new Bulletin PM 20 issued by Precision Machine Co., 5 Union Sq., Somerville 43, Mass. Use the coupon today.

Pipe Joint Essentials and

Couplings for Every Job

148. Superior pipe joints are tight, flexible, simple, strong and economical. Dresser's handsome 34-page bulletin No. 513 shows how these essentials are met and provides layouts for curves, working pressures and a wealth of other data. Be sure to check this bulletin on the coupon. Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa.

Be Sure To Investigate

The Be-Ge Trencher

171. Municipalities and contractors both report that the Be-Ge trencher, with its fully hydraulic operation and easy maneuverability, cuts costs and brings profits on all types of trenching jobs. Hydratons' fluid motor delivers smooth, positive power at any creep speed. Digs up to 24" wide and 5 ft. deep. Hydraulically controlled backfiller blade is standard equipment. Get form 520 from Be-Ge Mfg. Co., Gilroy, Calif., by checking the handy coupon.

Handy Calculator for

Cast Iron Pipe

175. With the handy Cast Iron Pipe Calculator you can determine at a glance the class, weight and dimensions of bell and spigot pipe. This slide-rule type calculator is absolutely free. Use coupon or write R. D. Wood Company, Public Ledger Bldg., Philadelphia 5, Pa.

How to Design

Chemical Feed Systems

179. In a 12-page booklet published by Proportioners, the many factors which enter into the design of a chemical feed system are discussed, and the types of systems used are described in detail. These include dry feed, both volumetric and gravimetric and solution feed of the decanter and positive displacement pump types. Feeder controls are considered in detail. Send now for File No. RP-9080 by checking coupon. Proportioners, Inc., Providence 1, R. I.

Locate Mains and Services

Without Digging

186. A 16-page booklet tells how to use the Fisher "M-Scope" to locate buried pipes and valves by electronic means. Proper manipulation also determines depth of cover. Battery operated unit is readily carried by one man. Get data from Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif.

Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833. Detailed information is provided on bar screens, grinders, grit collectors, "flirt" washers, sludge collectors, feeders, conveyors and other related units. Photos and drawings of installations plus capacity tables complete this valuable booklet. Use coupon or write Jeffrey Mfg. Co., 947 N. 4th St., Columbus 16, Ohio.

Technical Service Offers

Help on Fluoridation Planning

207. Helpful information to assist in planning new installations and improvement of existing fluoridation systems is available from General Chemical Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. Check the handy coupon today.

Chlorination for

Large and Small Pools

210. Dependable chlorination is a necessity for all swimming pools, no matter how large or small. You can find out just how to protect your pool in the most dependable and economical way by using the coupon or writing Wallace & Tiernan Co., Inc., Box 178, Newark 1, N. J.

Complete Catalog and Reference Data on Valves and Fittings

211. The entire M & H line of valves, fittings and accessories for water works, filtration, sewage disposal and fire protection are illustrated and fully detailed in Catalog 52 issued by M & H Valve & Fittings Co., Anniston, Ala. In addition to complete data on these products, there are many pages devoted to helpful engineering data. Every designer should have a copy. Get yours by checking the coupon.

Does Your Water Works

Have Standby Power?

224. Dependable Climax power plants are ready for emergency service to insure fire protection, and can also save power costs by peak load operation. Use the coupon for full data on Climax, 40 to 495 HP, operating on sewage or natural gas, butane or gasoline. Climax Engine & Pump Mfg. Co., 208 So. La Salle St., Chicago 3, Ill.

Investigate This Compact

Flow Meter for Water

226. The Foster "Flow Tube" is a new metering element that is compact and easy to install. Bulletin FT illustrates simple element containing nozzles for differential pressure production and shows capacity range and accuracy. Made in standard type sizes. Foster Engineering Co., Union, N. J. will send coupon, or use coupon.

Insurance Benefits

For Civil Employees

236. Civilian government employees are offered insurance protection at the lowest possible cost by Government Employees Insurance Companies, Gov't Employees Insurance Bldg., Washington 5, D. C. Full details available by checking the coupon.

All About

Centrifugal Pumps

258. Where pumping performance counts you want to check your specifications carefully. Investigate the features of Fairbanks-Morse centrifugals. Use coupon or write to Fairbanks, Morse & Co., Dept. PW, Chicago 5, Ill.

General Catalog on

Measuring and Controlling Equipment

272. The full line of Simplex equipment for the measurement and control of liquids and gases in water and sewage plant installations is illustrated and described in detail in 28-page Catalog 002. Every engineer should study the design data in this helpful booklet. Write Simplex Valve & Meter Co., 68th & Uplands Sts., Philadelphia 42, Pa., or use the coupon.

Corrosion Protection

For Water Works

280. Steel pipe lines, elevated tanks, treatment plant equipment and all other steel structures subject to rust, tuberculation and attack by aggressive soils can be protected by long-lasting Bitumastic enamels. Send for bulletins today so that you can specify the right coating for your job. Use coupon or write Koppers Co. Tar Products Div., Dept. 553T, Pittsburgh 15, Pa.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in a convenient booklet offered with the compliments of U. S. Pipe and Foundry Co., Burlington, N. J. Get your copy by checking the coupon.

CIVIL DEFENSE

Get the Facts on

Air Raid Sirens

286. There's more to be considered in air raid warning sirens than the loudness of the signal. Get complete information on efficient size and spacing of sirens from Federal Enterprises, Inc., 8733 So. State St., Chicago, Ill., by using coupon.

REFUSE COLLECTION AND DISPOSAL

20 Questions and Answers On Sanitary Landfill

75. The advantages of sanitary landfill, factors in site selection, kind and size of equipment needed, capacity of a given site and other important engineering considerations are discussed in Form 1084 prepared by the Truck-Knox Co., Dept. PW, Milwaukee 1, Wis. Check the coupon for complete information on this refuse disposal method.

How Load-Packers Reduce

Refuse Collection Costs

123. The sequence of operation for fast loading and refuse compression in the Gar Wood "Load-Packer" is illustrated and described in 8-page folder M 60, which also provides size data and details of hydraulic equipment. Be sure to check all features of the efficient Load-Packer system. Check coupon or write Gar Wood Industries, Wayne Div., Wayne, Mich.

Efficient Material Handling

to Reduce Incineration Costs

130. Blaw-Knox Buckets specially designed for refuse and garbage handling are described in 22-page Bulletin 130. Illustrations show progress of material through a modern municipal incinerator plant. Dimensions and incinerator bucket specifications are included. Blaw-Knox Div., 2124 Farmers Bank Bldg., Pittsburgh 22, Pa.

Investigate This Plan

For Garbage Elimination

164. A new presentation, written especially for municipal officials, offers a modern solution for the garbage disposal problem. Be sure you have this up-to-date information on the elimination of city garbage collection by the use of Hotpoint Disposal units. Check the coupon now. Hotpoint Disposal Department, 5600 West Taylor St., Chicago 44, Ill.

Increasing the Efficiency of

Bulk Rubbish Collection

177. Strategically spotted bulk containers can be handled by one man operating a Dempster-Dumpster equipped truck. Get full details of this cost-saving system of rubbish collection, as used by many cities to increase efficiency and eliminate unsanitary conditions. Write Dempster Brothers, Inc., 952 Dempster Bldg., Knoxville 17, Tenn., or use the handy coupon.

Save Garbage Collection

In Defense Housing

181. Defense housing projects won't drain manpower for garbage collection when Westinghouse Waste-Away Food Waste Disposers are installed in each kitchen. Helpful information for community planners is offered by Westinghouse Electric Corp., Electric Appliance Div., Mansfield, Ohio. Just check the coupon.

How to Build

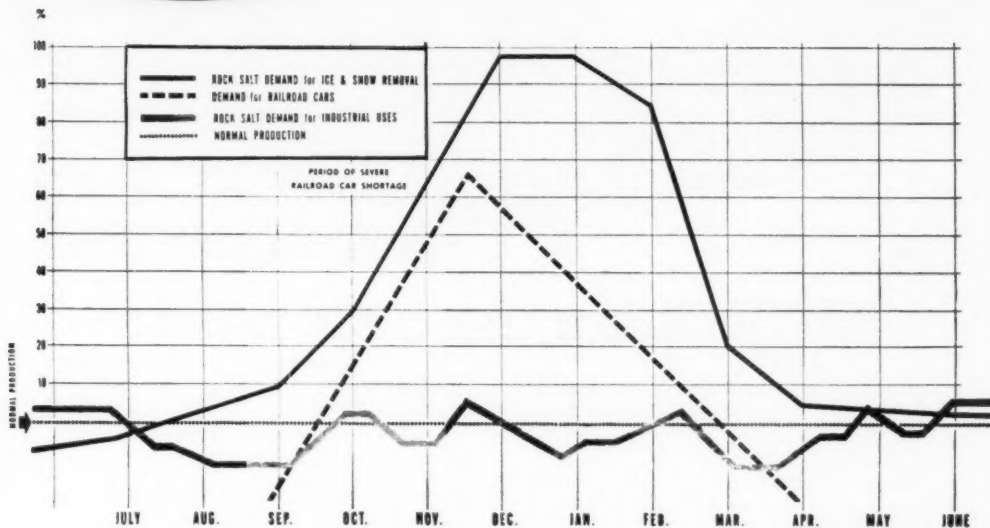
A Sanitary Land Fill

260. Proper use of equipment and the four steps necessary to build a good sanitary fill are shown in an illustrated folder prepared by Drott Mfg. Corp., Milwaukee 12, Wis. Check coupon today for your copy.

To order these helpful booklets check the coupon on page 26.

Guard against next winter now!

LOOK AT THE CHART BELOW. SEE THE DELAYS AND DISAPPOINTMENTS SURELY AWAITING YOU UNLESS YOU ORDER YOUR CAYUGA ROCK SALT NOW!



"A smart man buys before snow flies." 75% of next winter's salt should be in your bins before October 1. Look at the chart above and you will see what we mean. Notice the terrific Rock Salt demand between September and March. Note, too, the shortage of freight cars during September, October, and November. These are the months you will want Rock Salt in a hurry for highway snow and ice removal. Help us to help you by sending your order now, while we can make deliveries promptly.

Pile your Cayuga Rock Salt on any hard surface—an old road strip or tar paper. Cover the piles of bulk salt or salt in bags with RAYNSHED Vinylite plastic sheets. Cost so low you can discard after each season if you wish. Coverage costs about 30¢ to 65¢ per ton, according to pile's size and shape. Order direct from Chemical Corporation, Springfield, Mass. Write us for Data Sheet for estimating sizes needed for your salt storage.

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field 3, Mass. Phone 5-5691.
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ford, Conn. Phone 6-3233.
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3394; New Haven, Conn.
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KERR SALT CO., 961 S.

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E. J. FEDIGAN INC.,
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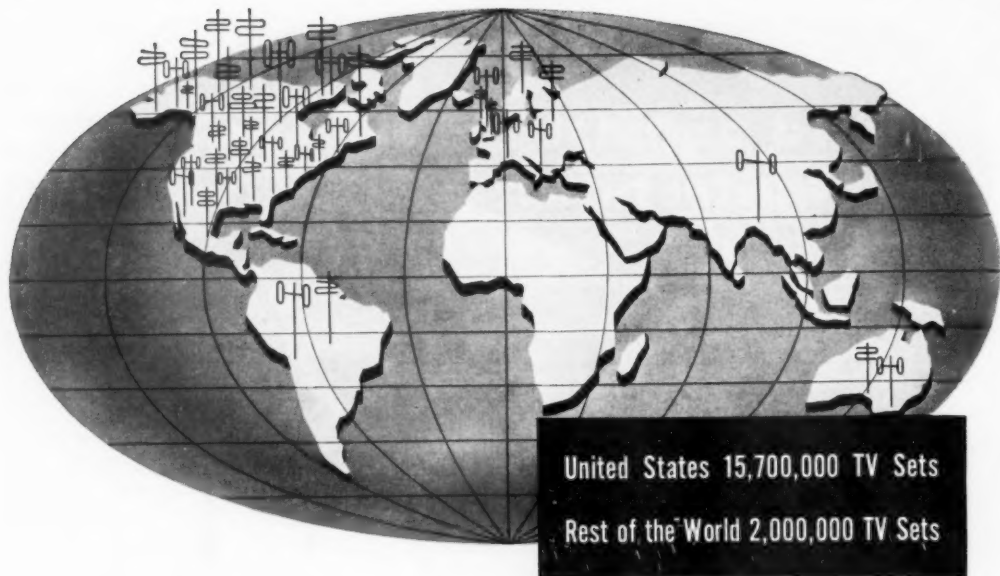
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gress, Rockland Co., N. Y.;
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COMPETITION Turns Luxuries into Necessities

To millions of people throughout the world, washing machines, radios and television sets are miraculous inventions remote from their lives . . . for the wealthy only.

In the United States, however, a new product appears in no time in the homes of wage earners as well as salaried executives.

Consider television, for example. Only 6,500 sets produced in 1946 . . . over 5,000,000 in 1951. Or washing machines . . . more than 24,000,000 in 10 years.

What has Competition to do with this?

Do you think we'd continue to get more and better products if only one company made each item or each line?

No! We get more and better products here in America, because anybody who thinks he can make anything better or sell it more efficiently is free to try.

And many succeed. Take electrical products like radios and television sets . . . and home appliances like washing machines and electric fans. Does the biggest company monopolize this industry? Not by a long shot! Even counting all its affiliated companies, it still sells less than 1/5 of such products bought in this country.

There are nearly a thousand other companies that make home appliances, radios and television sets. And they do more than 4/5's of the business! The

smallest of them make the biggest companies hustle their bones to keep making products better and better.

In America, a better product can always win consumer acceptance in any field.

Let's keep the COMPETITIVE SYSTEM working for us

The Competitive System can be killed! When industries are run by government, when taxes are so high that they destroy the incentive to work hard and risk savings in business ventures, the Competitive System languishes and dies.

You've seen it happen in other lands. Let's not let it happen here.

Let's all of us watch closely to see that those who represent us in government are working with us and for us to preserve our Competitive System; to assure a tax structure that leaves enough incentive to make hard work worthwhile, so that any man with ability and energy has a chance to earn good money and keep most of it.

Competition thrives best where the rewards are high. People live best where competition thrives.

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For Fly and Mosquito Control

CHLORDANE

Extensive laboratory and field tests, have established the effectiveness of chlordane in the control of mosquitoes. In addition to showing outstanding control of adult mosquitoes, chlordane has given effective results as a mosquito larvacide when applied to mosquito breeding places. Complete information as to proper applications and formulations gladly sent upon request.

VELSICOL HEPTACHLOR

... shows promise in control of mosquito larvae at dosages not to exceed 0.1 lb. actual heptachlor per acre. Experimental samples are available upon request.

VELSICOL CORPORATION

General Offices and Laboratories

330 East Grand Avenue, Chicago 11, Illinois

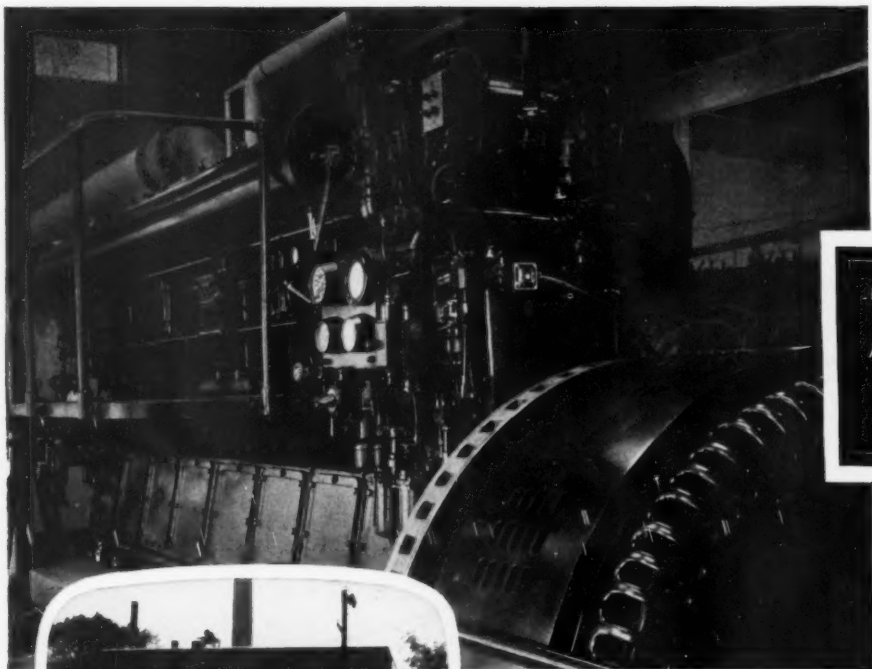
Export Division

100 East 42nd Street, New York 17, New York

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Need more facts about advertised products? Mail your Readers' Service card now.





Tecumseh Electric Plant, Tecumseh, Nebraska, where latest addition is the efficient Cooper-Bessemer gas-diesel shown above.

Why Tecumseh's Cooper-Bessemer Gas-Diesel gets no rest...

FOLLOWING conversion from steam to diesel back in 1925, Tecumseh's electric plant has been adding new diesels as load demands grew. Latest is the 8-cylinder Cooper-Bessemer supercharged JS gas-diesel shown here . . . added in 1950.

This engine is kept in virtually continuous operation for 2 simple reasons. First, it has demonstrated the dependability and need for only minimum down time that makes it the logical engine with which to meet base power demands. Second, it's the economical thing to do! Month

in, month out, the operating cost has been surprisingly low . . . as low as 3.3 mills per kwh. In plant after plant, Cooper-Bessemer gas engines, diesels and gas-diesels are showing exceptional records of dependability and economy. The nearest Cooper-Bessemer office will be glad to give you interesting facts on actual operation under conditions similar to yours.

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Corporation

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**Every city has its own water conditioning problem.
Every water conditioning problem has its own solution.**

PROBLEM No 1:

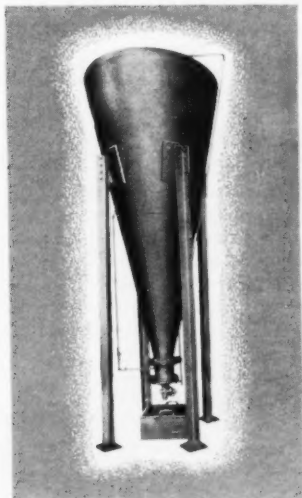
SLUDGE DISPOSAL.

Sludge from conventional softening processes contains 85% to 97% water by weight . . . requiring large land areas for lagooning or otherwise drying. Time and money are wasted. This nuisance is characteristic of *all* lime-soda water softening processes except . . .

SOLUTION:

PERMUTIT'S SPIRACTOR METHOD:

A cold lime-soda water softener with a revolutionary softening principle—*catalytic precipitation!* Spiractor's waste catalyst granules contain less than 10% water by weight after drainage—are easily disposed of, saving space . . . handling . . . costs.



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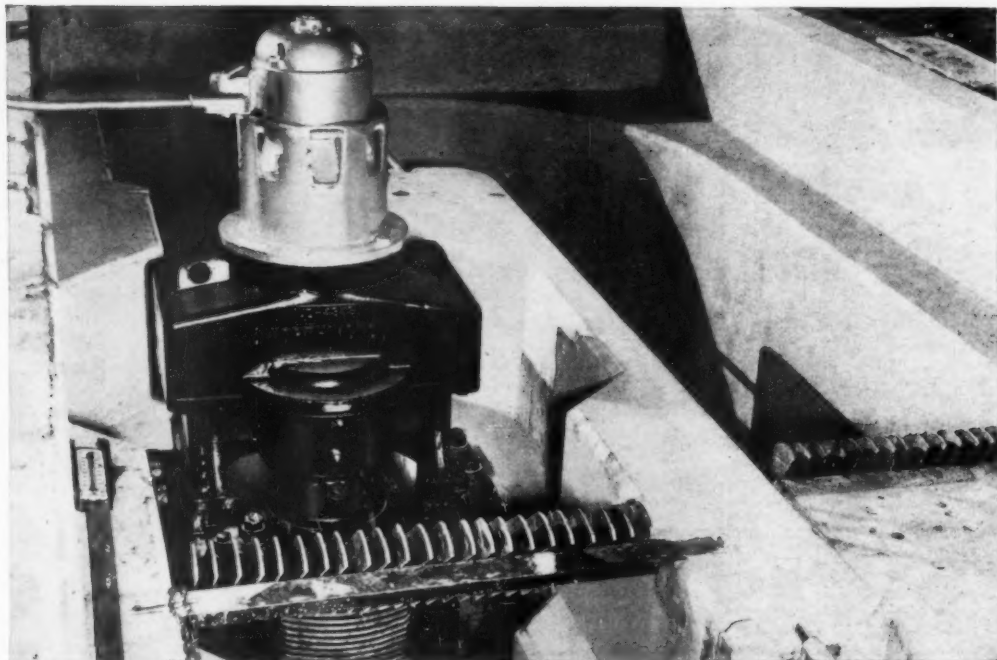
Operates speedily—softening takes *less than 8 minutes*. Hard water, lime, soda enter at base and swirl upward through catalyst. Calcium and magnesium are deposited on catalyst grains . . . gravitate toward the bottom. Water at top is soft, clear, low in alkalinity—ready for filtration.

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in excess of the comminutor's capacity. Screenings are later raked down into the comminutor during period of normal flow. The overflow screen makes the comminutor independent of the by-pass on right which may later be used as a channel for a second comminutor. Plant Superintendent is Edward P. Molitor.

Madison-Chatham, N. J., installation proves adaptability of Worthington COMMUNITOR

Typical example of the adaptability of the Worthington comminutor is the story of this installation at the Madison-Chatham Joint Meeting Sewage Treatment Plant in Chatham, N. J.

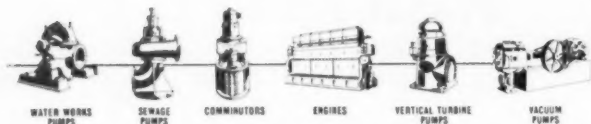
Engineers everywhere especially like the Worthington comminutor because:

- It can be readily installed in new or existing straight-flow rectangular channels.
- Cutter-racks are quickly removable for sharpening or replacement.

- It may be flooded without damage because it's protected by a mercury seal.

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W. 2.5



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You can get the complete story by calling your nearest Link-Belt office. Or write for Folder No. 2327.

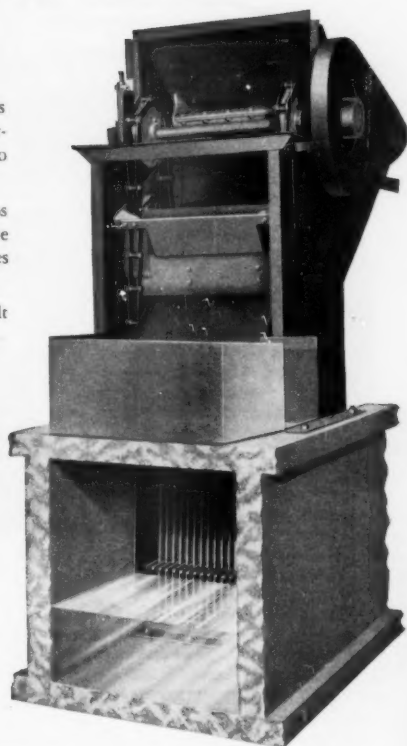
A FEW USERS OF THRU-CLEAN BAR SCREENS

Location	Sanitary Engineer
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Union Grove, Wis.	W. G. Hirschoffer
Port Huron, Mich.	Drury, McNamee & Porter
Idabel, Okla.	Collins Engineering
Storm Lake, Iowa	Buell & Winters
Camden, N. J.	Havens & Emerson
Rochester, Minn.	Toltz, King & Day

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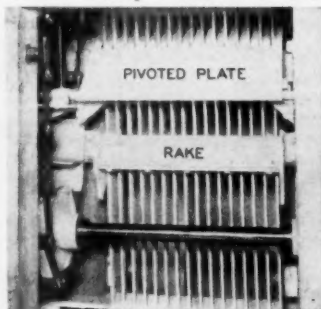
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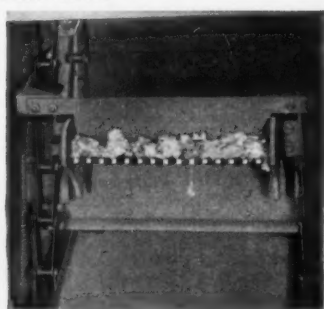
How rakes automatically clean bars "from the back"



Segmented steel rake is about to start its low-friction vertical movement. Entering from downstream side (shown), its forward and upward force precludes jamming or clogging. Travel starts at lowest point of channel, catches all solids retained by screen.



Cold-rolled steel bars, uniformly spaced, form screen. They are rigidly fixed at bottom of channel, extend only 6 in. beyond pivoted plate immediately above high water level. Simple, rugged construction minimizes maintenance. Low speed cuts power consumption.



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White Specialized Design

Speeds street oiling in Erie



THE CITY OF ERIE ERIE, PENNA.

DEPARTMENT OF STREETS
AND PUBLIC IMPROVEMENTS
THOMAS H. MCCARTY, Director
R. C. CRENS, Secretary

January 23, 1952

Mr. Robert F. Black, President
The White Motor Company
Cleveland 1, Ohio

Dear Mr. Black:

We would like to take this opportunity of expressing our complete satisfaction in our White 3000 streets oiler in handling the job of repeatedly oiling our approximate 110 miles of unpaved streets these past two (2) seasons.

Factors needed in a truck to do this job are short turning ability, wide visibility, and a shock-proof type of ride since frequent "chuck holes" are encountered on roads of this nature. Drivers report 100% satisfaction in our White 3000 for filling the bill in respect to the above conditions.

Our department is looking forward to many more years usage of this "job designed" truck.

With kindest regards,

Thomas H. McCarty
Thomas H. McCarty, Director
Department of Streets and
Public Improvements
City of Erie, Pennsylvania

TWC:c:bae

TAILORED exactly to the work it does, this White 3000 saves time . . . does more work.

And it costs less to operate . . . wins driver favor.

In Erie, Pa., and in many other public service applications across the nation, this new kind of truck is preferred because it does its work better, year after year.

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MODERN REHABILITATION Methods for BRIDGES

GUY H. ELBIN,
County Engineer
Franklin County, Ohio

OLD bridges with faulty floors or insufficient load bearing characteristics are one of the main problems of any present day county engineer. A high percentage of the structures which we county engineers of today are charged with maintaining, were built around the turn of the century when highway conditions were far different and present day floor loadings were unknown. Certainly no bridge designer of the 1900 era, when many of our existing bridges were built, ever dreamed of 45 million vehicles clogging our roads or that axle loadings of 24,000 lbs. would be a factor. Consequently many of our old structures are failing to serve the demands of traffic and the problem is further complicated by critical scarcities of steel with which to make necessary revisions.

The answer that we, in Franklin County, have found most satisfactory is to rely upon some of the newest steel bridge product developments to permit needed floor system changes with a minimum of steel. Secondly, we are relying upon

bituminous surfacing because of its initial economy and ease of maintenance. To illustrate how this theory has been put into practice, a description of our two most recent bridge renovations in the city of Columbus may trace our progress more clearly.

There were two bridges in the city of Columbus which were definitely inadequate for traffic requirements and which posed the problem of complete replacement or suitable modification. The first, known as the Grandview Avenue Bridge, was originally constructed in about 1900 and consisted of two 133' 8" spans with a 36-ft. roadway of 5-inch reinforced concrete. The roadway was in bad condition. In addition, some of the stringers were weakened and needed replacement to increase safe loading limits.

The second bridge—the Dodridge Street Bridge over the Olentangy River—consisted of two spans totaling 206 ft., with a 26' 8" roadway and an 8-ft. sidewalk on each side. This bridge had timber stringers and strip flooring, both of which were in bad condition and difficult to maintain.

The Grandview Avenue Bridge was an important one on the west side of the city over the Scioto River, and was serving both truck and passenger traffic to the northwest metropolitan section of the city. Traffic count was about 9,000 per 24 hours and the time element involved in making revisions was a highly important factor. The job was started by breaking and removing the old reinforced concrete floor after which all of the steel stringers were loosened, cleaned, the weak-



• **RECONSTRUCTING Dodridge St. bridge, which is 206 ft. long.**

ened ones replaced and all relaid and welded to the floor beams. Next, United Steel Fabricator's box corrugated structural plate bridge flooring was brought onto the job in 36-ft. prefabricated lengths and field welded to the stringers. This flooring was 7-ga. steel, shop punched for welding to stringers.

The finished road surfacing consisted of two courses of T-35 hot-mixed hot-laid asphaltic concrete. One of the obvious advantages of this type of floor construction was the stiffening effect this all-welded method had on the entire structure. By removing and replacing the floor stringer, both the floor beams and the stringers were newly welded tight. In addition, the USF structural plate flooring was welded at the valley of each corrugation to

each floor stringer and the edges of the plates were welded together with a 3-inch bead weld at the midpoint between stringers which gave as nearly as possible a completely homogenous floor system. This box corrugated type of flooring plate is light in weight, adding little to the dead load; yet, because of its efficient beam section, it adds a degree of strength not usually expected of such light gauge steel. The corrugated section also lends itself to the uniform support of bituminous flooring material and eliminates troublesome "corduroying".

Despite the sizable operation required to renovate this structure, the job was successfully completed by county forces in only 16 days and at a total cost of about \$20,000.

Reconstructing Dodridge St. Bridge

The second job, the Dodridge Street Bridge, was in relatively worse condition since it consisted of a timber floor system with a strip floor. Because of this, slightly more steel was required to make the structure serviceable, but it was nevertheless modernized with considerably less steel than would have been required to make a full replacement. This bridge served a heavily populated north end of the City, handling about 6600 vehicles every 24 hours. Once again it was a structure built in about 1900 with stone piers and abutments.

The first operation was to remove entirely the timber floor and floor system and replace the old wooden stringers with 10-inch and 12-inch steel stringers. The floor beams were reinforced to increase loading capacity from 10 to 15 tons.

The new steel stringers were welded to the floor beams for rigidity and were located in a staggered pattern. Next, prefabricated USF box corrugated structural steel bridge flooring was moved into

place and welded securely to the stringers. Special punching was provided in the USF flooring to accommodate the staggered stringer spacing.

New floor beam supports and new 8-inch I-beam stringers were installed for the sidewalks on each side and 8-inch channels were installed on each side of the roadway to serve as a curb; 12-gauge sidewalk plates also were laid.

Two courses of T-35 bituminous surfacing completed the roadway and a bituminous mix was also compacted on the sidewalk surfaces. No scuppers were required in the roadway because of the grade involved in the structure. In total, the project included the 2-span bridge amounting to 206 ft., plus surfacing of 50 feet of approach at either end of the bridge. The bridge deck consisted of 5525 sq. ft. and the sidewalks of an additional 3300 ft.

The total contract, including the surfacing of approaches and a complete repainting, amounted to about \$40,000.

Front-End Loaders Are Profitable for Vermont

H. E. SARGENT,

Chief Engineer,

Vermont Department of Highways

THOUGH every effort is being made to obtain practical motorized equipment for highway maintenance, our budget is limited and any quick changeover is difficult or impossible. During the past three years we have used front-end loaders mounted on farm tractors. Some were privately owned and three were State owned. The costs and performance of the State owned units indicated that it would be profitable to own more and also that they should be more rugged. During the same period various contractors in the state were using heavier loaders and we obtained information from them.

This past summer ten loaders were ordered. Two makes were chosen with the characteristics found most satisfactory for our use.

Many uses are being made of these front end loaders. During the retreatment season they are used to load aggregates from stock piles. Since the State gangs help the towns on small state aid jobs there are many moves to be made. With these loaders the whole outfit is mobile. When one job is done, the loader and distributor start for the next. One truck carries the spreader and another tows the roller on a trailer.

This past fall we cleaned ditches and cut shoulders with power graders and followed with a front end loader. The grader carried the surplus material to narrow fills if the distance was not too great. When the distance was too great the operator left it in a windrow and moved along. The loader followed and loaded any material thus left. Many miles were greatly improved at a reasonable cost.

This winter the same loaders are loading sand and salt. Since they are low, they can be driven into the salt storage sheds to load the salt. The sand is usually piled near the salt shed so the loader can do both jobs. If it is necessary to move to another sand pile, the loader can move on its own power. We also expect to use them for loading snow in some places.

In the spring we clean over ditches and even use these loaders for loading gravel where the material in the pits is not packed too hard.



• COMPLETING the Dodridge St. bridge by placing surfacing.



• PORTION of plant. Oil separating tank in center with sludging tanks on either side.

WASTE TREATMENT for a TANK MANUFACTURING PLANT

MANUFACTURE of 25-ton tanks is being carried on by General Motors Corp. in a plant in the southwestern area of Cleveland where, during World War II, bombers were manufactured. When General Motors began readying the plant for operation, it was realized that waste disposal facilities would have to be provided. The waste products were chiefly the so-called soluble cutting oil emulsions which are used in machining operations for lubrication, cooling and chip removal.

When General Motors discussed the disposition of these wastes with the City of Cleveland it was found that the sewers in that vicinity were so overloaded that they could not receive the wastes, even if treated. The Ohio State Department of Health was then asked to issue re-

JOHN KREMER

quirements for treatment, and on the basis of these requirements a plant was designed. The probable flow was determined to be 0.25 mgd per 8-hour shift but the plant is designed to handle a flow of 550 gpm when in full operation. The process of treatment is designed to break the emulsions by adding acid and iron salts; to separate the oil by gravity; then to flocculate and settle by adding more iron and activated silica; and feeding lime to raise the pH to about 10.

This plant was intended to discharge into Abrams Creek, a tributary of Rocky River. It was found that this creek was under the regu-

lations of the Cleveland Metropolitan Park Board, and that the Board requirements governing the quality of discharge wastes were exceedingly strict. These required color not over 50 ppm; turbidity not over 25 ppm; DO not less than 6 ppm; BOD not over 10 ppm; pH between 6.5 and 10; bacteria not over 1000 per 100 ml; visible oil none; temperature not over 90°F; iron not over 5 ppm; phenols not over 50 ppb; no sludges or trash; and suspended organic solids 15 ppm. In order to meet these requirements filtration, chlorination and aeration were added to the treatment previously planned.

The Soluble Oil Problem

Soluble oils are oils distributed in minute droplets throughout a much larger volume of water. Thus they are far cheaper as lubricants

and coolants for machining operations than is oil alone. Being largely aqueous, such soluble oils have a larger heat capacity than has oil, which is beneficial in cutting operations. But, in order to deliver these advantages, the soluble oil must be stable; that is, it must not separate into oil and oil-free water.

Great ingenuity has been shown by chemists in devising emulsifiers that will prevent breaking of the emulsion and will keep the oil dispersed through the water even under conditions of extreme heat, pressure, agitation and aeration. When such soluble oil wastes have to be disposed of, another chemist must try to break the first chemist's unbreakable emulsion; and this is not often done with ease and speed.

The Treatment Process

The waste liquids flow to a collection tank and thence to a sump from which they are pumped to a weir chamber which meters the flow to a vorti-mix unit. A feeder doses the waste with ferric sulphate; and sulphuric acid is also added at this point. Both of the feeders are automatically controlled by an L & N pH electrode; pH is usually maintained at about 6.5. The action in this unit breaks the emulsion, which separates into a predominantly oily upper layer and a watery lower layer.

From the vorti-mix, the waste flows to a clarifier where the separating action continues. Much of the oil rises to the top and can be skimmed off and stored. From the clarifier, the watery fraction is passed to two Cyclators. Here more ferric sulphate is added; also activated silica; and enough lime to raise the pH to about 10.0. The iron salts precipitate as a spongy floc which settles rather slowly, carrying down with it the minute oil particle still suspended in the water, as well as other suspended materials. In the Cyclator, provision is made for recirculation of the sludge resulting in more complete removal of the suspended matter.

Secondary Treatment

The sludge that settles to the bottom of the Cyclators is pumped to underdrained sludge drying beds of usual design. The water drained from the sludge is returned to the stirring chamber for another cycle of treatment.

The effluent from the Cyclators is passed through five standard type

pressure filters. The effluent from these filters then goes to a spray and cascade aerator. It is then chlorinated and treated with sodium chlorite to destroy phenols.

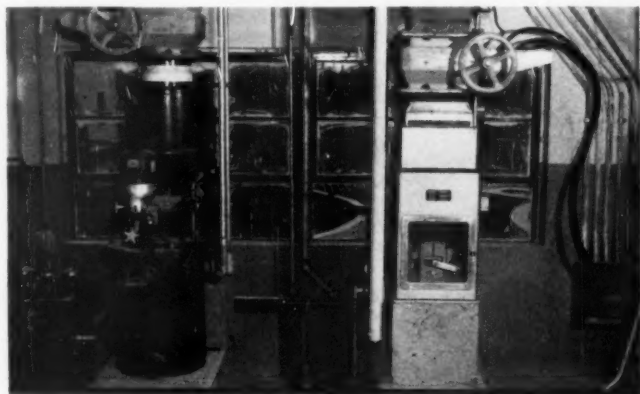
Samples can be taken at any stage in the secondary treatment process. A close check is maintained on the treatment efficiency by means of frequent analyses. If a high bacterial count is found, if too much oil remains in the treated waste, or if phenols are too high, the effluent may be returned for complete reprocessing. Bacterial counts may result from fermentation of the cutting oils or by chance contamination; however, no domestic sewage enters the system.

Final discharge is through an 18-inch vitrified clay outfall into a

storm sewer and thence to a tributary of Rocky River.

Equipment and Construction

The vorti-mix, the Cyclators, the clarifier, the pressure filters, the aerator and the chemical feeders were furnished by Inflico. Wallace & Tiernan supplied the chlorinator and sodium chlorite feeder. Pumps are Chicago. The control equipment and Micromax and Minmax recorders were supplied by Leeds & Northrup. Birmingham Construction Co., Birmingham, Mich., built the plant under the supervision of the General Motors Building and Design Department, from designs by the Argonaut Realty Division of General Motors. The treatment area is enclosed with a Cyclone fence.



• **FEEDERS** for applying ferric sulphate and lime are automatically controlled. These chemicals break the emulsion.



• **ELECTRONIC** recorder and controller maintains pH at about 10. Also shown on the panel are timers for sludge drawoff.



SPECIALIZED MAINTENANCE EQUIPMENT

• MOTOR grader ditching and striping sod from shoulders.

DELAMATER DAVIS, JR.,

Highway Equipment Engineer

Virginia Department of Highways

AN acute problem in personnel now faces the commonwealth of Virginia. The competition with industry and the Federal Government has depleted the forces of the Highway Department to the point where it is absolutely essential that specialized equipment be utilized to take the place of the former highway workers. With over 9,000 miles of primary roads and over 38,000 miles of secondary roads to maintain, Virginia has partially solved its maintenance problem through the extensive use of labor saving equipment.

Among the many types of specialized equipment are large brush cutters which have found their place in the maintenance of our rights-of-way, particularly on secondary roads. This brush cutter has full hydraulic controls with a 6-ft. cutter bar and is capable of reaching out 20 ft. from the edge of a hard

surface. It is mounted on a special heavy duty chassis since slow operation is essential in the cutting of heavy brush. Saplings and trees up to 3-inch are easily and quickly cut as this machine moves forward at about 1½ miles per hour. In event larger trees are encountered, either the machine must be stopped to allow the cutter bar to saw its way through the tree or an advance crew armed with gasoline engine powered saws must cut the tree ahead of the brush cutter.

Loaders Used Extensively

Another extensively worked machine is the force feed loader. The Highway Department has fifty-nine of these at the present time and they are doing outstanding work in our ditching operations. This very necessary work is usually performed by "gang headquarters" personnel whose equipment and materials are pooled for maintenance of highways in a particular area. Using a 50 to 75-horsepower diesel motor patrol grader, a force feed loader, and 4 to 6 two-ton dump trucks, a

very few men are able to operate as a very efficient ditching crew.

A truck mounted bucket loader has been developed by state equipment personnel and has been used the last five years for stockpile loading work. This loader has been particularly important due to its mobility in moving from one project to another without the use of a trailer or other equipment to haul it. It is generally able to load a truck in a minute. Recently, a similar manufactured loader has been delivered and has been used continuously as a part of the surface treating equipment.

A new type overhead loader has recently been introduced and, at the present time, is speeding our maintenance program by loading calcium chloride and sand for winter operations. It will be used for regular stockpile work during the spring, summer, and early fall in loading aggregate for black top work. This loader is mounted on a 35-horsepower, rubber tired tractor and has full hydraulic controls. Its

(Continued on page 106)

REQUIRED IMPROVEMENTS

What can be done to insure proper development of subdivisions?

A survey of subdivision requirements in 95 communities in the New York Metropolitan region has been made by the Regional Plan Association, Inc. The results were published in the March, 1952, Regional Plan Bulletin and are reproduced here, with minor omissions, because of the importance of this problem.

Questions raised most often by municipalities that have no land subdivision regulations and plan to undertake the control of new development for the first time are: What can be done to insure that new subdivisions will be improved properly? Should this be the responsibility of the developer or the municipality? Or should it be left to those who eventually will live in the new subdivisions to provide their own improvements?

A letter of inquiry was sent to all municipalities in the 17 counties outside New York City. Information was obtained from two-thirds of those that have subdivision regulations, including Nassau County, which administers such regulations for most of that fast-growing county (all except the incorporated villages). The 95 replies covered municipalities in all of the counties except Rockland. A review of the replies indicates that they are from communities representative of all the areas undergoing subdivision development. In general, no information was received from completely built-up cities and villages nor from wholly rural communities far from current development areas.

General Municipal Practice

The various communities differ greatly, first, with respect to which improvements of the thirteen kinds listed they consider essential; and second, with respect to who provides the improvements. In a majority of the municipalities surveyed, subdividers and developers are required to provide the first eight types of improvement shown

in the chart on page 56, that is: grading of streets, pavement, curbs, gutters, sidewalks, water mains, sanitary sewers, and storm water drains.

On the other hand, in a majority it is customary for the municipality itself to provide street lights and street signs but not to install any of the other improvements at general public expense.

About half the municipalities reporting require developers to pro-

In Long Island a lower proportion of communities require developers to provide the necessary sanitary sewers—municipalities provide them in nearly as many places.

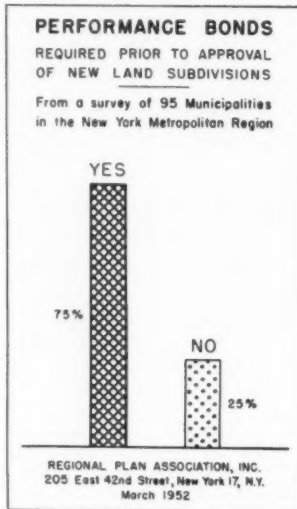
In Northern New Jersey a relatively higher proportion of municipalities require developers to install street curbs, sidewalks and water mains.

Nassau County, which regulates subdivisions in the territory outside cities and villages, warrants special attention. The county's requirements are among the most demanding of any surveyed. No less than nine of the thirteen types of improvement are provided at the expense of the developer. Of the other four, the county installs street lights; the developer occasionally is required to provide recreational areas; sanitary sewers are waived because the county sewerage system has not yet reached the unincorporated areas; and street trees are waived altogether. Nevertheless, with the cost of nine major improvement items borne by land subdividers, Nassau County has been undergoing an astonishing rate of development—the highest in the entire Region. This appears to refute the notion sometimes expressed in support of "easy" regulations that proper requirements will prevent community growth.

Standards and Specifications

Beyond the question of the categories of land development improvement which are required, the survey also investigated the standards and specifications that govern their design and construction in the various municipalities. How wide should street or sidewalk pavement be? What is a suitable pavement? How do these vary according to the type of street? Are dead-end streets improved to the same specifications as through-traffic streets? What maximum street grades are considered safe?

Some towns have neither design standards nor construction specifications. They determine these separately for each land subdivision. This procedure is readily open to discriminatory practices. Further, it



vide fire hydrants; the other half install hydrants at public expense.

Less than 40 percent of the municipalities require street trees and recreational areas. In this connection it should be emphasized that a serious lack of playground and recreational space is known to prevail in virtually all the newly developed sections of the metropolitan region. This is evidence that few municipalities actually are requiring the setting aside of adequate recreational areas even though so authorized by State Law.

In general, there is little difference among the various sections of the Region as such. The two major variations are:

in NEW LAND SUBDIVISIONS

may cause trouble for a municipality when a shoestring developer presents "just as good as" specifications and the planning board lacks any "yardsticks" for evaluating them properly.

The survey discloses that 85 percent of the municipalities reporting say that they do have improvement regulations, although a review of many standards and specifications sent to the Association indicates that some are quite rudimentary.

Inspection Costs and Performance Bonds

While well conceived regulations are absolutely essential, they are useless, of course, unless the work itself is completed in accordance with the approved plans and specifications. Hence, it is the usual practice for municipalities to inspect and approve construction as it progresses. For example, water lines and sewers are checked before the trenches in which they lie are back-filled. In many communities such inspections are made at the developer's expense, paid for by means of special fees.

Three-fourths of the municipalities surveyed reported that they require developers to post performance bonds sufficient in amount to

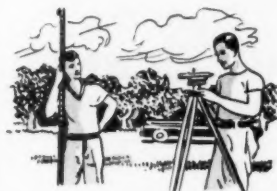
enable the municipality to complete the improvements in the event the developer defaults.

Performance bonds have a value not only for this basic purpose, but also for expediting development. Prior to the establishment of such bonding procedures, the only way a municipality could insure that the required improvements would be installed was to require the physical completion of the improvements before approving a subdivision plan. Inasmuch as the developer could not file the plan and sell lots until then, considerable funds often were tied up unnecessarily, and good development was hampered.

If a New York developer wishes to obtain planning board approval, file his plat, and sell lots before completing the required improvements, a performance bond is re-

quired under New York State legislation regulating land subdivision. In New Jersey and Connecticut, however, while planning boards are authorized by statute to request and obtain performance bonds, the procedure is not mandatory unless special local legislation applies. Nevertheless, even in these states, the requirement that a performance bond be posted is the general rule.

It is interesting to note that in New York State the early statute dealing with new subdivisions authorized planning boards to regulate only the design element aspects of street rights-of-way and lots. The construction of improvements—roads, sidewalks, sewers, etc.—was considered a private matter between the subdivider and the buyer. This led to many undesirable situations affecting the public, however, and to such widespread individual hardship that additional legislation was adopted in 1938. In the public interest, the planning boards in New York now are authorized to approve new subdivision plats only if arrangement has been made for a series of required improvements to be installed (except in special circumstances where particular improvements have been waived by planning action as being



MUNICIPAL PRACTICE IN PROVIDING FOR IMPROVEMENTS IN NEW LAND SUBDIVISIONS

From Survey of 95 Municipalities in New York Metropolitan Region—1951

Note: In addition to the 89 municipalities tabulated above the report of the Regional Plan Association includes 6 other New York State municipalities.

	New Jersey Sector (47)				Long Island Sector (20)				Westchester-Fairfield Sector (22)			
	D*	M	O	N	D	M	O	N	D	M	O	N
Grading of Streets	98%	0%	2%	0%	95%	5%	0%	0%	96%	0%	0%	4%
Pavement	96	2	2	0	84	10	0	6	82	9	0	9
Curbs	87	0	2	11	69	5	0	26	64	5	18	13
Gutters	64	0	2	34	58	5	0	37	73	5	9	13
Sidewalks	72	0	6	22	63	10	0	27	59	0	18	23
Water Mains	83	8	9	0	42	16	21	21	64	9	14	13
Sanitary Sewers	70	0	2	28	26	21	10	43	77	9	9	5
Storm Water Drains	85	2	0	13	84	10	0	6	86	5	0	9
Fire Hydrants	46	46	2	6	32	32	16	20	45	45	0	10
Street Lights	15	57	6	22	16	47	10	27	5	77	0	18
Street Signs	28	53	0	19	37	47	0	16	9	82	0	9
Street Trees	49	25	2	14	42	21	0	37	27	32	0	41
Recreation Areas	38	21	0	41	26	16	5	53	59	9	0	31

*D—By Developer; M—By Municipality; O—By Other Means; N—None.

unnecessary). While Connecticut and New Jersey statutes do not require the planning boards to insist on the improvements, they authorize the planning boards to do so.

Two basic municipal policies with respect to improvements in new subdivisions might be stated thus:

The decision as to which improvements will be required and which (if any) waived will depend on the intended character of the particular district involved (as implied in the zoning ordinance).

In most suburban situations where the zoning calls for lots smaller than one acre, it probably will be found that all thirteen categories of improvement (listed on the chart) will be needed in the long run. Hence, all should be required at the outset when it is easiest to get them. The aim may be a more informal and countrylike neighborhood character in areas zoned above an acre per family. Here, it may be appropriate for sidewalks to appear on one side of the street only, street lighting to be limited to places of traffic concentration and street paving to be less durable than concrete or penetration macadam.

Whatever improvements are required in a new land subdivision shall be paid for generally by the

developer, so that present residents in the community will not have to pay for them.

It is evident from the foregoing survey that this policy, however desirable, is not being attained fully at present. Indeed, in certain communities the local economic needs may justify a different approach—municipalities supported mainly by business or industrial taxes for example. These may prosper best if the development of well-planned residential neighborhoods for the more modest income groups needed in the shops and factories is stimulated by a small degree of community-wide sharing in the cost of development.

Experience has shown such participation to be fraught with danger, however. It is recommended, therefore, that developers generally should be required to install all the necessary improvements at their own expense. Five sound reasons follow:

Where this is not done, the developer may operate with little investment and thus be encouraged to speculate. If the subdivision is not successful, he can abandon it with little loss. If required to provide the improvements, however, he will be more careful and will not

cut up land where there is doubtful demand.

One problem of municipalities today is that of soaring taxes, resulting in part from new homes of low taxable valuation. Municipalities can keep their total tax requirements lower if the cost of street improvements is borne by developers.

When proper improvements are made as an integral part of a new subdivision, the lots and homes are more valuable and more salable.

Street improvements can be made more economically at the time a subdivision is developed than later on, when the purchasers of homes in the development bring pressure on the municipality to do the work.

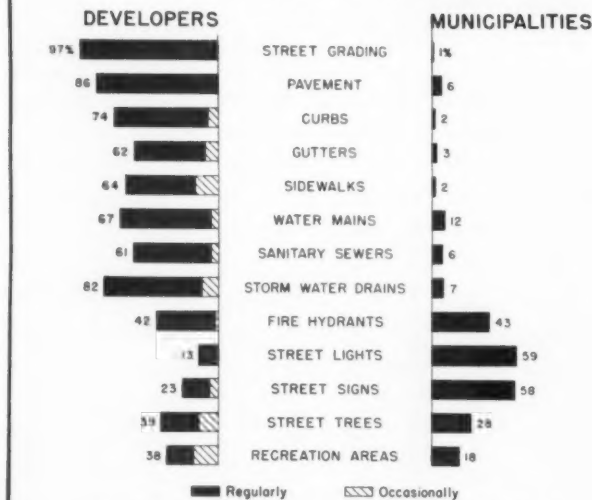
Requiring improvements financed by the developer tends to prevent basically unsound and uneconomical subdivisions. The costs of land drainage, sanitary waste disposal and similar facilities may prove far out of line with the value of the projected homes. If the developer is not required to make the needed improvements, but merely to furnish a paper map, he can prepare ambitious plans, sell the lots and get out. However, if the developer has to provide the improvements, in certain cases he may consider it uneconomical to subdivide.

Henry Fagin is Planning Director of the Regional Plan Association, Inc., 205 E 42nd St., New York, which has available data in regard to this important problem.

• • • Curing Fallen Arches and Soft Footings

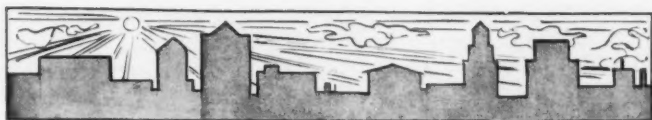
In 1917-18 Kenosha, Wis., built 1800 ft. of 66-inch combined sewer of monolithic concrete. Inspection in 1951 showed numerous cracks in the crown and erosion of the invert. Repair and strengthening was necessary, and several methods were considered. Relining with corrugated metal pipe was chosen in preference to guniting and clay liner plates for, although it would cost somewhat more, it afforded adequate strength to support the old arch, and it could be installed without interrupting or diverting sewage flow. Armco asbestos-bonded pipe 62 ins. in diameter was used. The space between the old sewer and the metal pipe was filled with portland cement grout, applied through openings cut in the crown of every other section of pipe. The cost, including catch-basin and house connections, manhole steps and miscellaneous work, was slightly over \$36 a foot.

METHODS OF FINANCING STREET IMPROVEMENTS IN NEW SUBDIVISIONS



Regional Plan Association, Inc., 205 East 42nd Street, New York 17, N Y

New



DUAL FUEL ENGINE CUTS CITY POWER COSTS

A NEW 2,800-hp. Fairbanks-Morse dual-fuel engine is producing power in the Falls City, Nebraska, municipal plant at a total fuel cost of 3.15 mills per kilowatt-hour. This economy is being achieved with 20-cent gas and 11-cent fuel oil and represents a saving of 63% compared with previous diesel fuel costs. The engine has eight cylinders, 18-in. bore and 27-in. stroke, and develops its rated horsepower at 277 rpm. It drives a 1,984-kw. Fairbanks-Morse alternator with 25-kw. exciter.

The Falls City plant illustrates both modern engine economy and diesel durability. The first engine installed when the city switched over from steam power in 1926 was a 720-hp. Model 33 Style M FM diesel. Twenty-five years later, this same unit operates every day, teaming up with the new engine to carry the load.

The story of this plant's expansion is the classic one, with successive

installations of larger and larger engines. In 1928, an 840-hp. engine went into service; two years later, a 1,000-hp. unit of the same type was installed; in 1936, a 1,400-hp. engine was put in; and in 1942, 1,600-hp. was added. All of these were two-cycle, pump-scavenging, mechanical - injection Fairbanks-Morse diesels.

Finally, in December, 1950, the 2,800-hp. engine went into full service as a diesel and generated more than 1,000,000 kwh in the next three months at an average of 14.07 kwh per gal. of fuel. Then, in March, 1951, the unit was switched to natural gas and fuel costs really went down.

Gas Reduces Cost

The first indication of what could be accomplished was the first half of the city's fiscal year 1951-52, the period from May through October, 1951. In these six months, the new engine produced 2,442,000 kwh, 46.3

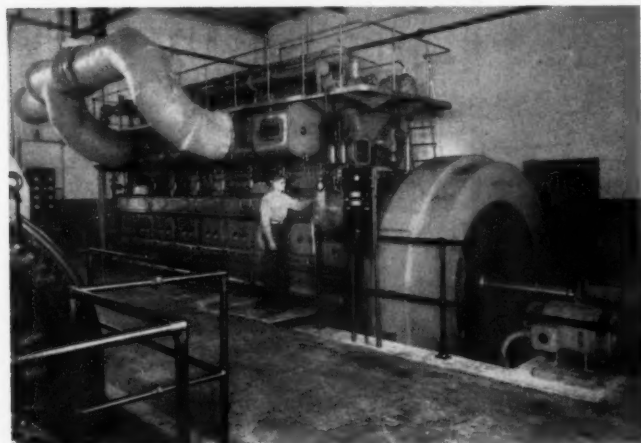
percent of the plant total output. The cost of gas, per kwh, was 0.238 cent, and of pilot oil 0.077 cent, a total fuel cost of 0.315 cent per kwh. In the fiscal year 1950-51, the diesels averaged a fuel cost per kwh of 0.845 cent. Thus, the new engine cut fuel costs 0.53 cent per kwh, a reduction of 63%. In the six month period reported, this represented a saving of nearly \$13,000.

A 30-32 gravity gas oil is used for pilot fuel. Stored in two 12,000-gal. tanks, it is transferred by a motor-driven pump through duplex bag-type filters to an elevated day tank from which it flows through a meter and another duplex filter to the separate pilot oil injection pumps on the engine. The natural gas reaches the plant at 35 lbs., then passes through an orifice-type meter and a regulator which cuts it down to 30 lbs., the pressure at which it goes to the engine.

The engine can be switched instantly from dual fuel to full diesel operation and there is a second day tank for the 26 gravity diesel fuel. Falls City is in the midst of the oil fields and the fuel is delivered hot from a nearby supplier and stored in two steam-heated tanks with combined capacity of 48,000 gals. This is the oil used for all the diesels.

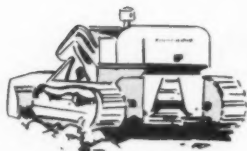
The engine has a separate cooling system with a pair of 6-in. centrifugal pumps driven by 20-hp. motors to circulate soft water through the engine jackets and the coils of an atmospheric tower. The tower is set in a pond in such a way that water level can be raised to cover the coils during the Winter. An 8-in. turbine pump puts water through the tower sprays. Either rain water or 12-grain city water is used for makeup. The latter is brought to 4-grain hardness in a zeolite softener.

The engine is fully equipped with
(Continued on page 105)



● DUAL-fuel FM engine, 2,800 hp, drives 1,984-kw generator. This engine averaged 11.79 cu. ft. of gas per kilowatt-hour.

Special Equipment



DEWEY W. JOHNSON

SEVERAL miles of large cast iron transmission main, with several big feeder mains, are now being installed by the Springfield, Ill., Water Department. The equipment used by the contractor for installing these large mains is of special interest. The first portion of the new 36-inch main was laid across country in open fields, but

tor at a time, sometimes even less.

The trench was excavated by using a $\frac{1}{2}$ -yard General, Model 307, back-hoe which was equipped with side cutters. This backhoe was also used for digging the bell holes in the bottom of the trench with the fine trimming being performed by laborers with air spades. Right behind the back-hoe was a Lorain 20-foot boom caterpillar hoist for handling the pipe from the curbing into the trench. A special Tractor-Air-Compressor unit and lead furnace trailer was on the opposite side of the trench for making the lead joints, and right behind this was the bulldozer pushing in the backfill.

The contract price for the labor to install this job was quite low when compared with similar undertakings, and for that reason, the contractor provided more than adequate equipment to the workmen.

ardous job for two men. With all this in mind, a Le Roi 105 combination tractor and air compressor was purchased by the contractor and then a special four-wheel trailer was constructed for carrying two large size lead furnaces with Hauck gas burners. Above the two lead pots a small boom derrick was erected and this was provided with a hoist and trolley. The front of the tractor was equipped with a small Wagner iron works loader bucket so that it could clear a suitable roadway along the trench for itself and the lead pot trailer.

This combined compressor-caulker-lead pot-hoist unit moved right along the trench and handled the hot lead from the melting pots right into the joints. A steel tool box was attached to the rear of the tractor for the air hose, caulking tools, jack, hammers, etc., and a platform built just ahead of the lead



• TRACTOR with compressor, bucket and hoist pulls lead trailer and handles lead to trench.



• SPECIAL pipe tongs easily handle 36-inch pipe lengths which weigh about 3 tons each.

at least two-thirds of it had to be constructed along city streets. The city job necessitated a tight, compact working force. Traffic conditions and school children required the greatest safety precautions, the latter being a constant source of worry and trouble; for they could not be kept off the job. Therefore, it was advisable to open the trench only as fast as the laying crew could install the pipe and caulk up the joints. Usually only 200 feet of street was occupied by the contrac-

All of the pipe, fittings, lead, valves, etc., were purchased by the city and were on hand, ready to be installed by the labor contractor.

Versatile Equipment

A very unusual and versatile piece of equipment was constructed for making lead joints. A 36-inch water main requires 65 to 77 lbs. of molten lead for each joint. The melting of the lead and the carrying of this size ladle down into the trench to pour the joint is a haz-

pots for the 100# bars of pig lead, bales of jute, etc. All the joints were caulked with air hammers and tested to 135 lbs. water pressure with measured leakage tests covering each section between valves. The lead pots were chained alongside of the furnaces to prevent slop-over of hot lead whenever the tractor moved forward along the line. Air from the compressor was used on the Hauck burners to replace hand pumping.

A temporary plug for closing off

FOR INSTALLING LARGE DIAMETER CAST IRON *Water Main*



● **WACHS air-driven pipe cutter made cuts in short time with complete safety to operator.**



● **PLUG for temporary closing pipe line was made of metal plates and automobile inner tube.**

the end of the pipe at night or whenever the work was stopped for any length of time was constructed of local materials. This plug was designed to serve two purposes: (1) to keep trench water out of the pipe, and (2) to prevent the entrance of animals and children into the pipe when the workmen were not on the job. It was not intended to serve as a test plug for making the 135 lbs. hydraulic test on the line. The weight was intentionally kept at a minimum so that the workmen would be inclined to use it on all job stoppages. A cast iron test plug for a 36-inch main weighs several hundred pounds and, human nature being what it is, heavy plugs are only used when someone gives and enforces orders.

The two outside discs of this plug have a rolled edge and were made from 1/16-inch steel sheets. An old automobile inner tube was used for the sealing membrane. The discs, which are spaced four inches apart by a spool of 1/16-inch sheet metal, are of proper diameter to fit the inside face of the tube. A small hole was cut in the outer disc so that the air valve of the tube would

be on the outside where it could be inflated or deflated as desired. The plug was made to fit the inside diameter of the pipe and not the bell of the pipe so that it could be used any place along the line or in fittings.

A few pounds of air pressure from the caulking compressor and the plug could not be removed from the line without wrecking it; even with all of the air out of the tube, small children would not be able to remove it from the pipe. A large handle welded to the outside disc eases the job of installation. The plug is low in cost and can be easily constructed by a local welder.

Pipe Lifting Tong

A special pipe lifting tong, purchased for this particular job from the Superior Equipment Company of Bucyrus, Ohio, was used for handling all the pipe. These cast iron pipes were manufactured in 16-foot lengths and weighed almost three tons each. The tong fits neatly around the pipe and by a lever action below the middle of the pipe, keeps a firm grip whenever a

tension is applied to the lift cable. The use of this device eliminates the use of blocks and the necessity for excavating a notch in the bottom of the trench for the removal of ropes, slings, or cables.

A Wachs pipe cutting machine was used for making all cuts. This machine is operated by compressed air and makes a beautiful cut. If the cut is to be made on the trench bank the pipe is placed on a couple of 4" x 4" timbers so that it can be rolled over as the machine cuts around the pipe. This is a milling type cutter and the cutting blade is first allowed to cut entirely through the wall of the pipe and then the saw feeds itself around the pipe at a speed depending on the air pressure and the metal thickness of the pipe wall. The machine can also be used to cut pipe after it has been caulked into place in the line. It is necessary only to make an excavation of about 16 inches under the pipe so that the machine and air hose can make a complete pass around the pipe. A 36-inch pipe can be cut in about 45 minutes, and the use of this machine
(Continued on page 83)

Airport Engineers must

M. T. "TOMMY" TUCKER

Airport Engineer,
Los Angeles Department of Airports
As told to Don Frank

SOMETIMES, in the comparative quiet of night at our Los Angeles International Airport, I imagine that I can hear the happy chortling of the airplane designers at their drawing boards in the huge aircraft factories bordering our field. If hair can be felt to turn gray, I feel it all over that part of my head which isn't bald. I take another gulp of coffee and start probing the future: what can the designers be thinking of now that will be dropped in my lap tomorrow?

The ingenuity that keeps America pre-eminent in the skyways is making of our airport engineering fraternity a race of occult seers. Unlike highway engineers on whose facilities travel vehicles regulated as to size and axle load, airport engineers must outguess manufacturers over whom we have no control whatever.

Planes get bigger and heavier; the higher tire pressures have about reached the point where standard highway design paving is no longer adequate for plane taxiway use. Yet funds for airports are almost always limited, and design must be a continual compromise with the engineer held accountable for current over-design.

"Here in Los Angeles—"

Here, in Los Angeles, the burgeoning International Airport is a prime example of a facility which is entirely at the mercy of the product using it. In 1938, we had a few scattered buildings on 640 acres, a single runway, an operating deficit and a total revenue of \$25,000.

Barely fourteen years later, we have 878 acres in use (with 2,586 leveled and waiting for development), nine airlines and two aircraft factories which employ more than 35,000 persons for an annual payroll of well over \$180,000,000. We maintain our own drainage, sewerage and lighting systems, stand second in the United States in air



• LAYOUT, not yet approved, for proposed new Terminal Building.

express tonnage, third in air mail, and fourth in air freight and revenue passengers. In 1950, we returned \$114,479.01 to the City on bond issue principal and interest.

And there seems to be no end in sight; the progress of past years will be accelerated as planes move faster and more often. Peak hours now see forty plane movements every sixty minutes. Better than 70% more military planes are using the Airport now than in 1947. Every twenty-six seconds a passenger enters or leaves our terminal building. What will the figures be next year? Or the year after?

What of The Future?

The necessity of an airport engineer projecting his imagination well into the future is vividly illustrated by the requirement that airport development be designed on the basis of peak requirements. It is entirely conceivable, for instance, that highway traffic may be inconvenienced to the point of waiting for several hours if traffic congestion requires it. On the other hand, plane traffic scheduled to land can only be delayed for short periods and time beyond that might spell the difference between life and death.

Thus, when larger and faster air-

craft brought about a decision to extend our airport runways to almost double their present length and underpass them for 1,910 feet for Sepulveda Boulevard, a major California State Highway, it was necessary to specify that at least one major runway be kept open at all times.

Layout and design of airport facilities in or near developed areas must recognize the need for such underpasses to avoid conflict between surface traffic and plane traffic. Since an underpass under a single runway would be a minimum of 530 feet long, the problem is many times more severe than that encountered in designing parkways where the length of an underpass for local surface traffic would be but a fraction of the airplane requirement.

Subway Carrier Runways

To solve the problems presented by our runway extension, we have undertaken the first vehicular subway structure in the United States that will actually support two major airport runways and two taxiways.

The project will ultimately cost about \$3,000,000 and will incorporate one of the most complete and fully automatic ventilating systems known, as well as a new type

keep Two Jumps Ahead

of tunnel lighting whose intensity increases as it approaches each exit. Six-lane traffic is expected to move through the subway by about November of next year. The project began in September, 1950, with 54% of the funds contributed by CAA.

Speed of construction and all the problems of designing for an impact load whose maximum we can barely foresee have made this new Sepulveda Boulevard vehicular subway a challenging project. Overall planning was under the supervision of Lloyd Aldrich, Los Angeles City Engineer; principal designs were prepared by the Division of Bridges and Structures of our City's Bureau of Engineering.

In order always to keep one runway open—with a particular view to an increased national emergency—we divided our contract for actual excavation and building of the solid slab-type rigid frame bridge structure into two units, specifying completion of the first half of the tunnel before the other half was started.

Our deck structure itself was planned to be an actual part of the runways and taxiways. It has been designed for a maximum total combined live load plus impact of 400,000 pounds on four wheels in line. This, we hopefully imagine, should be sufficient to handle the heaviest commercial airliners, the fastest jet fighters and the biggest bombers in the foreseeable future. If we have calculated incorrectly, we tell each other wistfully, the taxpayers will certainly declare that we did our work with a ouija board instead of using intelligent engineering practices.

But it is not only the untrammelled imagination of aircraft designers that bedevil airport engineers. The possibility of hostile action by an enemy nation must constantly be foreseen. This is particularly true in the design and construction of electrical services.

Electrical Headaches

Electrical distribution throughout the airport area must, of course, be underground to avoid hazards. Radical changes in runway and taxiway lighting requires more and more cables. Location of underground duct systems must be carefully integrated between the needs

of building areas and landing areas to provide the widespread coverage of accepted practice. More than in most industries using underground electrical distribution, airports need spare ducts. So rapid an advance has been made in electrical apparatus that power loads are increasing at fabulous rates.

High intensity runway lighting, such navigational aids as ILS (instrument landing system), the slope line approach lighting system, search radar and the final approach radar (known as ground control approach—GCA) have insatiable electrical appetites.

And in the background of all electrical design must be the thought of adequate operation of the facility despite any sudden wartime development. Alternate commercial electrical power services are not enough, as in most industries; standby generator plants must be provided in our design to cover all possibilities of emergencies.

Drains and Sewers

The same underground piping requirements, by the way, are met in removal of storm drain water. While collecting gutters which parallel runways can be used, we must revert to underground pipe to avoid hazards in the landing area, and our drainage designs are restricted to an abnormal extent.

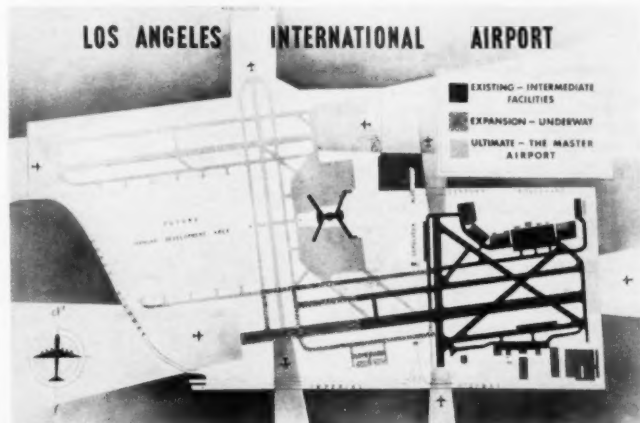
A few months ago, our airport engineering department was treated to an edifying (for the engineers) illustration of the way the public sees airport problems as opposed to actual facts. The development program of Los Angeles International Airport involved, among other items, the grading of 1,470 additional acres of airport land, addition of two hangars totaling 90,000 square feet, and sundry maintenance buildings. In connection with a proposed bond issue, our information bureau noted that \$2,376,220 would be invested in utilities.

Several prominent members of the community were indignant over this particular item. "Do you mean you're going to spend that much money for sewers and such stuff?" they demanded. "Such an amount isn't even needed where they put hundreds of houses in a development covering even more area!"

Water Main Problems

Our engineers noted ruefully, as the bond issue failed of passage, that the general public ought to be brought up to date on airport water mains.

Mains for an airport development, unlike those on housing projects, must serve a multi-purpose use beyond domestic and commercial use to buildings. The serving sources must be economically located to (Continued on page 103)



• MASTER plan for LA's Airport which will cover 2,586 acres when finally completed. Entire area is already leveled.

Solving a Public Works Problem through COMMUNITY RELATIONS

CARL H. WALKER

Coordinator, Educational Division,
Department of Public Works,
Detroit, Mich.

LARGE cities have many problems common to each other. One of these is the collection and disposal of household wastes. Because the operation of our municipal waste collection and disposal system in Detroit is one of the more important jobs we do, we are continually working to make it more efficient and effective.

When speaking of a waste disposal system, actually we are talking about the rendering of a particular kind of public service. The public have the right to expect a good waste disposal service and at a reasonable cost. The service should be both convenient and reliable so the people served can have confidence in it and depend on it.

Before deciding on a plan for improving our waste disposal service we found it necessary to analyze the unique characteristics of our city. The plan we eventually adopted was based largely on this analysis. Like most large cities, Detroit consists of different kinds of areas, each area varying in population, density, types of dwellings, degree of home ownership, income levels and social composition.

From our analysis we concluded that each area, in many respects, is a community unto itself. In this sense our city is comprised of a network of small communities. With this in mind, we proceeded to devise our waste disposal system and



techniques to implement them according to the variations of the communities in our city.

Waste Handling Organization

Detroit's Department of Public Works collects wastes from all private residences, multiple dwellings and commercial establishments, with the exception of industries. For waste disposal purposes, the city is divided into seven Sanitation Districts. Waste collection crews are organized according to these Districts. Each District consists of Sections subdivided to conform with work-day operations.

Garbage and all other combustible wastes are collected as closely as possible on a weekly schedule and hauled to the city's four incinerator plants for disposal. Householders are asked to wrap all garbage to facilitate burning. Bi-weekly collections of tin cans, bottles and other non-combustibles are trucked to landfills located outside the city limits. To give the complete service, it is necessary to make over 1,500,000 collection stops every two weeks.

A major objective of the Department has been to establish uniform collection and disposal procedures throughout the city. This could only be accomplished by requiring absolute separation of combustible materials from non-combustible ma-

terials and specifying the kind of waste containers householders should use. Yet no matter how far our operational techniques could be improved, we found 85 per cent of the total improvement factor remained and could only result from the efforts of the people themselves.

A New Ordinance

It was necessary to draft a new City Ordinance incorporating the changes we wanted to put into effect. Once the ordinance was adopted, however, certain questions would still have to be answered:

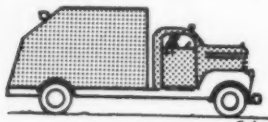
How receptive would Mr. & Mrs. Householder be to these changes?

Would they conform with them?

What was the best way to secure conformity?

Consequently, we decided to pretest the ordinance. An average community of 1200 homes was selected. In this community we discovered an active property-owners' association. The board of directors of the association was contacted and informed of our program. General membership meetings were arranged. The association adopted the program as their own and appointed block captains to carry the information about the program to each home in their community.

The Department kept its part of the bargain by maintaining regular waste collection schedules. Householders did their part by separating wastes and using proper containers for storing wastes between collections. In a relatively short period of time we secured 95 per cent conformity in the community. The results of this test project convinced us that we were on the right track. The new ordinance was therefore adopted and we proceeded to implement it in other communities in the same way we conducted the program in the test community.



Fundamental Community Relations

Our experiences with this program illustrated many fundamental principles about the nature of community relations. We have used this knowledge to advantage in putting over other Public Works programs.

The people of any particular community, we found, are interested only in the problems of their own community. They are not concerned with city-wide problems unless their immediate community is affected: For example, Westsiders care little about what may be confronting people living on the East Side.

Other experiences led us to conclude that programs designed to aid Public Works operations should be conducted on a community basis, rather than on a city-wide basis. Spectacular campaigns attract attention, but they usually fizzle out afterward with few lasting results.

Before moving into a community with one of our programs we attempt to ascertain as closely as possible the opinion of the people living in the community. How do they feel about us? What are they thinking?

Next, we survey the community block by block, paying attention to the kinds of homes and the general tenor of the community in terms of maintaining their property values.

Are their homes and yards kept clean and orderly?

There are other important things to know about a community such as economic status, church membership and educational level. Are the people predominately renters or homeowners? All of these factors have to be taken into consideration before launching a program in a community.



● **NON-burnable wastes are hauled to landfills outside city.**

We have to know whom we are going to be talking with and develop our material so that we will be talking WITH them and not AT them. Our best results have come from working closely with community organizations. In this way

direct personal contact is possible and we become a working part of the organization in an advisory capacity. Through these organizations it has been easy to gain interest and support for our programs.

One of the barriers we have to overcome is the all too common attitude "I pay taxes; let the city do it." The municipal service can take care of only 15 per cent of the job and in our community meetings we emphasize that the job of keeping a community clean depends primarily upon the people living in the community.

You cannot sell a program to a community by saying that money will be saved or that taxes will be reduced. Even if it were true few people would believe you. Besides, they are more interested in getting better services for the same amount of money.

We receive calls from persons daily requesting services or making complaints. Analysis indicates that lack of information, rather than lack of service, is at the bottom of many of these complaints. After working with people on a particular program for a short while, we hear more than anything else, "I didn't know, why hasn't someone told me this before?"

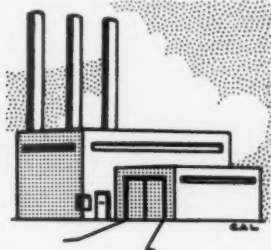
Community relations means keeping the people informed. Not only must you tell them what is going to happen, you must also tell them WHY it is going to happen. WHY is the more important part. When you tell them WHY you must be ready with specific answers to their specific problems. They will not be satisfied with less and they are entitled to an explanation.

The information you will give leads to understanding, followed closely by appreciation of the public service job you are performing. From an understanding, appreciative public you can easily obtain cooperation.

When you have the public working along with you on a problem you are well on your way toward solving it.



● **ONE of the four incinerators operated by the City of Detroit. Collection trucks at left; 20-yd. load of ashes in foreground.**



HOW TO OPERATE SANITARY LANDFILL IN REALLY COLD WEATHER

E. J. BOOTH,

City Engineer, Bismarck, North Dakota,
and

DONALD KEAGY,

North Dakota State Dept. of Health

EXTENSIVE studies are being made by the U. S. Public Health Service and the State Health Department on the sanitary landfill method of disposal for the northern areas which experience severe winter weather. Here are the experiences and problems encountered thus far in the operation of the Bismarck, North Dakota, sanitary landfill. The problem is approached here only from the operational standpoint.

On February 15, 1951, the Board of City Commissioners received bids on crawler-type tractors for use in converting the open-face dump to a sanitary landfill to be used for disposal of garbage and refuse. The proposal to furnish an International TD-14 crawler tractor equipped with a Drott bullclam shovel was accepted.

Motion pictures, in color, were taken of the dump grounds before any conversion operations began. It is intended that the story of the initial year of operation will be recorded on this film. The tractor immediately began to level off the old dump and slope the steep embankments. The rubble was compacted and covered with inert material from the top of the dump.

It is difficult to describe the sight of the rats as they were routed from their burrows. The frost had not yet left the ground and they were still "holed up." Bewildered rats were running by the hundreds as the tractor proceeded with its conversion operations. It was evident that the dump grounds would

have to be baited for rats before the conversion was completed for fear that they would migrate to neighboring farms or into the city. However, it was also desired to begin landfill operations as soon as possible. Therefore, conversion operations were confined to a small section until poisoning of the dump could be completed.

The dump was baited for rats using 1080 and ground horse meat. This was done in cooperation with

prevalent that day produced discouraging results in that about half of the refuse was scattered over the area. The trial load was chosen at random and turned out to be probably the most difficult type to handle at a sanitary landfill. It consisted mainly of loose office waste paper which was shoveled out of the rear of the van. There was no protection whatsoever from the wind and most of the paper did not touch the ground until it had traveled one



● **MATERIAL that goes into a fill; it needs to be compacted.**

the City Health Department and the Federal Fish and Wildlife Service on May 2. The kill was considered average but not as high as expected. It was felt that poisoning would have to be done again one or more times in the near future.

Rat Eradication

On the fifth day after commencing conversion a forty foot section of bank was prepared in order to receive some garbage and refuse as a trial. Forty-mile per hour winds

hundred feet or more. We soon realized that some protection was needed against strong winds and that a fence was necessary to catch the paper that did blow. One hundred feet of snow fence erected about forty feet from the landfilling operations was satisfactory.

The remaining banks were broken down and leveled off as time permitted along with landfilling operations. After almost two weeks of this endeavor to clean up the site, it was decided that the tractor

should be operated in two eight-hour shifts in order to accomplish the result within the desired length of time. This was completed within one month and we returned to the single eight-hour shift.

Since trees over five inches in diameter are cumbersome and difficult to handle at a sanitary landfill, it was felt that a tree-burning site should be selected and marked. This was located adjacent to the site of operations and yet in such a place that it did not hinder normal operations. The tractor and bullclam cut an access road and piled the brush and trees together for burning. This was done at intervals of approximately one week and the pile was fired when wind and weather conditions were favorable.

Initially, the project experienced "growing pains" with many trials and errors. The problems were relatively minor in nature and readily solved on the job. It soon became apparent that good compaction of the refuse and cover material was necessary and that hazardous methods produced a hazardous-looking site.

Normal Operations Are Started

On June 11, the site was considered in shape to start normal operations. We began the deliberate, organized method of area filling. In this, the garbage and refuse was dumped from the top down the face of the bank or ramp. The tractor, working from the bottom area, spread, compacted and covered the material. Thus the bank retained its slope and slowly crept over the low area, raising the elevation to the desired height.

The area is now developed to the stage where we have approximately 500 feet of ramp running east and west, perpendicular to prevailing winds, and approximately 200 feet of ramp running north and south. This arrangement allows for shifting our operations so that trucks may dump with the wind and the materials slide down the ramp, thus greatly eliminating the problem of blowing paper. The material is compacted in cells roughly eight to ten feet in width and six to eight feet in depth. To close the cell, the material is brought up from the bottom of the ramp thus providing a definite, well-compacted cell. The tractor travels a forward and backward pattern, never moving the cover material over 150 feet. As the borrow pit



● **COVERING the compacted fill with dirt — the final step. This procedure includes also compaction of the cover dirt.**

moves back, the fill moves forward holding the same contour.

A concrete block shop has been constructed at the site to provide storage for the tractor. Heating facilities and diesel fuel tank storage for fuel oil have been installed. The shop was constructed large enough so that all service and repair work may be done inside.

Once in a while, well-meaning citizens try to assist the city in operations by setting fire to the presently exposed refuse so that there will not be so much material to be buried. This, of course, is merely reverting back to the old burning dump—just the situation we are trying to eliminate. Signs stating "Please Do Not Burn Garbage" were erected, but fires occasionally did break out after working hours. By completing the cells as often as practicable and thereby

keeping the presently exposed material to a minimum, such fires can be extinguished readily by the tractor smothering it with earth and fires are confined to those which are small in size and extent.

Promiscuous Dumping

There have been some instances of promiscuous dumping of refuse despite the directing signs, the instructions of the foreman and tractor operator, or the obvious indications of where the material should be dumped. For a while it was felt that the area should be fenced in and hours of dumping posted—in other words, "controlled dumping." However, the number of such instances did not warrant the expenditure and trouble. Furthermore, as the area improved in appearance, due to the cleaning-up

(Continued on page 102)



● **AFTER the refuse is deposited, the tractor passes over it several times to insure proper compaction of contents.**

FILTERED water is now supplied to the 5600 people of Clarkston, Wash., by the Washington Water Power Co. The new water filter plant, built at a cost of about \$400,000, will supply up to 3 million gallons of filtered water daily. In addition, the city has recently completed a new sewage treatment plant providing primary treatment for the municipal wastes before discharge into the Snake River.

floc of optimum size for clarification. This is accomplished by a Link-Belt Straightline horizontal paddle mixer set in a tank 21 ft. by 24 ft. with an 11-ft. water depth. There are two parallel rows of 8-ft. diameter paddles mounted on drive shafts which are supported at the ends and the middle. Paddle blades are of redwood, bolted to steel spiders. The mixer is operated at 0.5 to 1.5 ft. per second by a 1-hp

the clarified water passes to the filters, which are of sand with underdrains of Carborundum porous plates. From the filters, the water goes to a 750,000-gal. storage reservoir.

R. C. Smolenski is the superintendent of Water Works; C. F. Whetsler is the chief operator. The headquarters of the Washington Water Power Co. are in Spokane, Wash. W. L. Maloney of Spokane was the consulting engineer. Pictures and data were obtained through a visit to the new plant by R. B. Kern and H. A. Garland of Link-Belt, to whom we are indebted for the data in this article.

Sewage Treatment

The sewage treatment plant provides primary treatment. It consists of a mechanically cleaned cable bar screen and two sedimentation tanks equipped with Link-Belt Straightline collectors. The two settling tanks are each 12 ft. wide and 52 ft. long with an average depth of 11 ft.

The bar screen is placed in a channel 4 ft. wide; the bars are spaced to provide a clear opening of 1-9/16 ins. Cleaning is by a rake operated by a 1/4-hp motor controlled by a limit switch. The sludge collectors are of standard design, with Promal chains and redwood flights at 10-ft. intervals. A rotoline scum trough is provided at the effluent end of the tanks. The sludge collectors are individually driven by 1/2-hp Gearmotors.

The consulting engineer on the sewage treatment plant was R. H. Corey of Portland, Ore. A. V. Kennedy is Superintendent of the Treatment Plant.

WATER FILTRATION AND SEWAGE TREATMENT FOR CLARKSTON

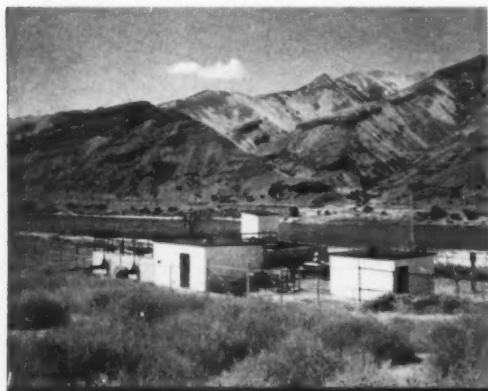
The Water Treatment Plant

Treatment consists of flocculation, sedimentation and filtration. From a 19-mg reservoir, the water flows into a flocculation chamber where it is rapid-mixed and then slow-mixed. The rapid mixing unit is a Link-Belt flash mixer operating in a tank 6 ft. square and 12 ft. deep. This quick-mixer is a 4-bladed propeller, operating on a vertical shaft without underwater bearings. Speed is 100 rpm and power is by a 3/4-hp motor through an enclosed worm gear drive.

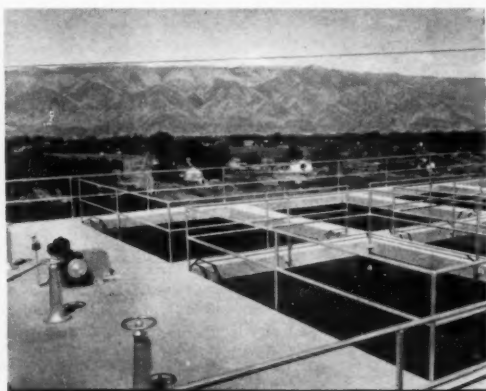
The rapid mixing is followed by slow and gentle stirring to produce

Link-Belt motorized variable speed drive (PIV) which is mounted above the tank. The paddle shafts are driven by two malleable iron chain drives.

From the mixing units, the water flows to a two-compartment settling tank, 38 ft. wide and 70 ft. long, with an average depth of 13 ft. This is equipped with Link-Belt Straightline sludge collectors set to operate at a speed of 2 ft. per minute. Flights are redwood, spaced at 10-ft. intervals. Operation is by a single 1-hp enclosed motorized worm gear drive through a common drive shaft connected to individual head shafts. From the settling tanks,



● SEWAGE treatment plant along Snake River.



● SEDIMENTATION tanks, water treatment plant.

Motor Graders, Bulldozers and Loaders Help Maintenance Team



● **LARGE motor grader** is one of the units that is indispensable for maintenance operations.



● **CRAWLER-tractor bulldozer** is another indispensable unit, usable on many types of jobs.



● **FORCE-feed loader** is exceptionally efficient in loading from a windrow into trucks.



● **FRONT-end wheel type loader** is valuable because of high mobility and great capacity.

THE use of special and improved equipment to reduce the amount of labor required on maintenance and force account work is and has been progressively increasing for a number of years. Any number of small items of special equipment are used that affect only an extremely small percentage of the overall labor requirement. I refer to such items as chain saws, steam cleaning units, power wrenches, portable power operated disc saws and brush cutters, concrete saws, gasoline powered vibrating tampers, the widener-spreader, chemi-

B. W. DAVIS
Chief Equipment Engineer,
State Highway & Public Works
Comm., North Carolina

cal spreaders (for snow and ice control), mulch blowers, etc. However, in my opinion, the three units of equipment most extensively used that are the greatest labor saving devices are the crawler tractor dozer, the large motor grader and the loader.

The crawler tractor-dozer unit and the large motor grader (100-HP diesel—24,000 lb. tandem drive or all-wheel-drive) are the two units of equipment that are indispensable. A large percentage of all road construction and maintenance (clearing, grubbing, grading, ditching, bank sloping, mixing, surface finishing, etc.) can either be done with these two units or is dependent on them for economical procedure. Most of our crawler tractor-dozer units are 73 to 100-HP maximum drawbar (AC HD-10, (Continued on page 81)



● THIS is the Austin, Tex., activated sludge plant with special feed line in place.

OPERATING ACTIVATED SLUDGE PLANTS

A. A. KALINSKE and
H. W. GILLARD

THE operator of an activated sludge plant has control over several variables which he can alter in order that the plant may function at its maximum efficiency. The variables subject to control can be listed as follows: (1) Concentration of solids in the mixed liquor; (2) rate of air supply; (3) rate of sludge return; (4) aeration time; (5) dissolved oxygen in the mixed liquor; and (6) condition of sludge.

The oxidation-absorption balance can, to a large degree, be controlled by increasing or decreasing the amount of sludge in the aeration basins. To do this necessitates the measuring of the suspended solids in the aeration basin gravimetrically. Experience in diffused air plants indicates that the suspended solids are usually maintained between 1,500 and 2,500 ppm in the aeration basins. In mechanical aeration plants the average is usually less than in diffused air plants and varies somewhere between 500 and 1,200 ppm. A high concentration of solids in the mixed liquor will speed up the absorption process, and the

rate of oxidation will be faster, but to maintain such conditions a greater amount of air will have to be supplied. Usually with a higher sludge content the aeration period can be shorter for a given degree of treatment. In general it is desirable to keep the solids somewhat on the high side since there is less danger of the plant being upset by sudden heavy loads of strong sewage or industrial wastes. However, an excess amount of solids in the mixed liquor may cause rising floc in the final clarifier due to the excessive height of the sludge blanket.

Relative to the concentration of solids in the mixed liquor, another important measurement is the so-called Mohlman Index. This sludge index attempts to relate the volume of settleable solids with the actual weight of these solids, and is defined as being the volume in cc. occupied by one gram of sludge solids after settling 30 minutes. To compute it from measurements, the simplest way is to multiply the percent sludge by volume after 30 minutes settling in a 500 cc. graduate by 10,000, and divide that product by the ppm. of suspended solids by weight in the same sample. A sludge index between 100 and 200 is considered satisfactory. A sludge having an index in this range will settle

quickly and should not give any difficulty in the clarification basin. If the index is 300 or above the sludge is considered to be in a bulking state and difficulty may be encountered in the clarifier due to the expansion of the sludge blanket.

Sludge Return

In most plants, the rate of sludge return from the final clarifier to the aeration basin averages about 25% of the throughput rate. Deviations from this will occur, depending on the strength of the sewage, amount of industrial wastes present in the sewage, and the density of the sludge itself. The condition of the sludge in the aeration basin is influenced considerably by the rate of return of sludge from the clarifier. The sludge should not be allowed to remain so long in the clarifier that it is becoming septic. In some plants re-aeration of the returned sludge is helpful, and such practice is common in England. However, many engineers and plant operators in this country feel that re-aeration basins are not worthwhile and that putting the same tank volume into the aeration tank is just as effective. In general, it may be said that if the ratio of the sludge to the raw sewage is too low, or if the sewage contains an excessive amount of oxidizable organic mat-

ter, then reaeration of the returned sludge should be of value.

A visual examination of the mixed liquor by taking a sample in a 500 cc. graduate reveals considerable information about the quality of the sludge. A good activated sludge will start flocculating very quickly as soon as quiescent conditions have been obtained. Supernatant above the sludge should be clear as the solids settle down. The color of the solids should be from light to moderate brown. In large plants microscopic examinations of the biological life are made to see if the balance between the different organisms present in good activated sludge is being maintained.

Quantity of Air

The amount of air supplied to the aeration basins of diffused air plants varies from about $\frac{1}{2}$ to 2 cubic feet per gallon of sewage treated. The average design figure for domestic sewage of average strength is 1 cubic foot for each gallon. Naturally stronger sewages, especially those that contain industrial wastes, will need more air and this probably will increase somewhat in proportion to the strength of the sewage as measured by the BOD. In any plant, the rate of air application should be varied. During periods of low flows of weak sewage the amount of air supplied must be reduced. Otherwise over-oxidation of the sludge may occur. In general, a good criterion for amount of air has been found to be that which will maintain a dissolved oxygen content at the end of the aeration basins of not less than 1 ppm. However, some operators prefer to keep this as high as 2 ppm.

The activated sludge process functions most efficiently when the pH of the mixed liquor is between 7 and 8. Much lower or higher values of the pH may impair the operation of the plant. Therefore, plants which receive industrial wastes of either low or high pH may have to make some adjustment.

An activated sludge plant which is not designed to handle the maximum flow and strength of sewage or waste coming to it will give trouble when such extra loads do appear. It has been stated that activated sludge plants are subject to upsets due to shock loads. However, there is no reason why such upsets should occur if the engineer has designed his plant to handle the maximum flow and maximum strength of sewage or waste that will come to the plant.

Sludge Bulking

One of the most annoying problems occurs in an activated sludge plant when the sludge becomes "bulky" which means that the sludge is of low density and is slow in settling. There is evidence that bulking can be of two types: One type is where the sludge is well flocculated but the flocs are extremely large and the sludge index is high, say above 300. Evidence indicates that such bulking will occur if aeration is inadequate. Either the rate of air supply is too low for the organic matter being supplied to the sludge, or the aeration period is too short. With this type of bulking, though the floc settles slowly, the supernatant is quite clear. A second type of bulking is that in which there seems to be no definite line of separation between the solids and the liquid. Examination of such a sludge under the microscope may indicate a thread-



like bacteria called *Sphaerotilus*. This type of bulking seems more likely to occur when there is excess sugar or starch in the sewage due to industrial wastes. Also, an excessive concentration of organic matter in the sewage and inadequate aeration may cause this condition.

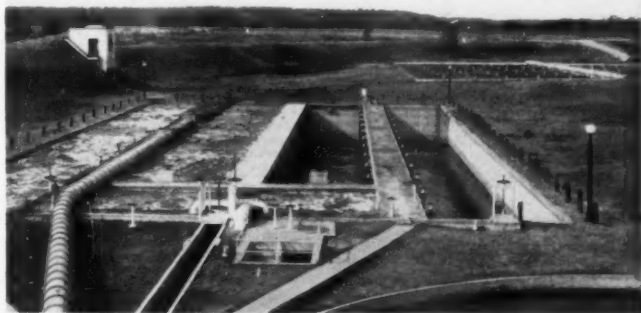
The first type of bulking can best be corrected by reducing the or-

ganic load or increasing the air supply. Unfortunately, once such bulking is started it is difficult to eliminate it simply by increasing the air supply. A reduction in the sewage load is a better immediate solution. Another method of obtaining immediate and fairly rapid relief from the first type of bulking is to add some sort of weighting agent such as clay, silt, pulverized limestone, or any other fast settling inert compound.

Bulking Control

In the type of bulking which is definitely caused by the growth of the filamentous *Sphaerotilus* several methods have been helpful. At many plants the application of chlorine to the return sludge has controlled such undesirable bacterial growths. Increasing the aeration period and the amount of air has also been helpful; and reaeration of the sludge has been effective in some places. Bulking has also been corrected in certain instances by the addition of lime so as to raise the pH to about 8 or slightly above for several hours. It is believed that the lime absorbs the excess carbon dioxide that is present in over-loaded sludge and thus permits the organisms to increase their activity. An excess of carbon dioxide will, of course, limit the activity of the organisms, since this is one of their waste products.

In general it can be stated that bulking is due to the maintenance of an improper balance between the absorption and oxidation phases of the activated sludge process. Whenever oxidation lags behind absorption for a prolonged period the



● **HIGH-rate activated sludge process, used at Austin, permits an overloaded plant to handle flow with half its capacity unused.**

sludge will deteriorate and will have poor settling qualities.

Sludge Rising

A phenomena referred to as sludge rising has occurred at several plants but this is not true bulking, as we refer to it. Rising of the sludge occurs in the final clarifier and may be due to one of two causes: One is where the sludge is retained too long in the clarifier and septicity sets in with resultant gas production causing the sludge to rise to the surface. Another phenomena of rising sludge which has been observed by Bradney at the Sioux Falls, S. D., plant, is that if the sludge is kept too long in the clarifier it will rise, due to the formation of very tiny gas bubbles on each particle of floc. This is not a septic condition since the time for such rising to occur may be of the order of only 30 minutes retention in the final clarifier. It was definitely shown that this sludge rising problem was due to the fact that there was an extremely high nitrite and nitrate content in the aerator effluent due to packing house wastes. In the absence of oxygen at the bottom of the clarifier, denitrification occurred with the release of small bubbles of nitrogen which attached themselves to the floc and caused it to rise. This condition was corrected by close control of the period of time that the sludge is allowed to remain in the final clarifier. This period of time may be as short as 30 minutes during the summer but can be somewhat longer during the winter.

If too much grease or oil comes to the aeration basins of an activated sludge plant efficiency will decrease sharply. The reason is that the grease and oil tend to coat the floc particles and prevent their absorption of organic matter and the utilization of the oxygen. Ordinary amounts of grease present in domestic sewage are not detrimental; however, an excessive amount of grease such as might come from a packing house waste, or from oils that are dumped from oil refineries or garages and service stations may cause considerable trouble.

Physical Maintenance

One of the problems in the physical maintenance of activated sludge plants is that of clogging of the air diffusers. In some plants cleaning has to be resorted to several times a year. At some other plants diffuser plates have not clogged during 10

to 12 years of operation. Diffuser clogging can be due to organic growths which accumulate on the plate surface and restrict the pore openings; to grease and oil accumulations on top of the plates; to silt and dirt deposited on the underside of the plates when the air supply is not properly filtered; and to hard-water scale and sand and silt impregnations on the top surfaces of plates. Industrial wastes containing ferrous iron in sufficient concentration to form a hydrate are oxidized during aeration and the hydrate deposits on the top of the plates and may penetrate into the surface pores.

Many methods of diffuser cleaning have been used. Where organic growths are the difficulty, the plates are cleaned by dewatering the tanks, brushing them with stiff brushes and contacting them with a 25% caustic soda solution for about 24 hours. In some plants, the plates are removed and dipped into such a solution. Grease and oil accumulations are removed by the use of low pressure steam and brushing. Hard-water scale is removed by the application of weak muriatic acid solution. Diffuser tubes are cleaned in some plants by taking them out of the aeration basins and using a high velocity stream of water on them. Ferrous iron deposits are removed by brushing and application of a solution of equal parts of water and sulfuric acid.

Foaming of the aeration tanks has been encountered at several activated sludge plants. Recently there has been an increase in such foaming troubles and this may be due to the increased use of detergents by housewives and laundries. Eckenfelder and Hood recently discussed this problem, and though they indicate that such increased use of detergents may certainly cause foaming, in the concentrations normally present it is difficult to conceive that foaming would be due to the presence of these chemicals. They indicated that at their own plant at Ridgewood, New Jersey, foaming many times occurred late Sunday night when the soap and detergent concentration and general sewage strength were at the minimum. They have explained such foaming by showing from experimental data that, at a stage of oxidation which seems to be between the carbonaceous state and the nitrification state, organic compounds are produced which tend to depress the surface tension and

cause foaming. It is a state of oxidation which any plant may pass through when normally it is receiving a fairly strong sewage and then for several hours or even days the sewage strength decreases but the aeration rate is not decreased accordingly. Foaming can also be caused by the presence of an excessive amount of grease and oil coming to the plant with industrial wastes. To prevent foaming the basic cause should be removed or corrected; however, considerable relief can be obtained by the use of fine water sprays which tend to break up this foam as it forms on the top of aeration basins.

In some activated sludge plants, digester supernatant has caused difficulties. Its addition to the primary clarifier tends to produce septic conditions in this unit. Its direct addition to the aeration basins has, in some instances, caused bulking of sludge, according to plant operators. However, in several plants the addition of digester effluent has aided materially in improving the activated sludge process and has been instrumental in eliminating bulking. For instance, Krause of Peoria, Illinois, mixes the digester overflow with the return activated sludge and the mixture is aerated. The overflow from these tanks is then added to the normal return activated sludge going to the regular aeration tanks of the plant. He also has added the bottom sludge from the digesters with equally satisfactory results. Ullrich of Austin, Texas, has also found that the addition of digester supernatant is important in controlling and preventing bulking of the sludge in his plant. The exact reasons why the addition of supernatant is beneficial are not too apparent. Digester sludge or supernatant has a nitrate content and also a high alkalinity. It may be that the addition of this extra nitrate and alkalinity is beneficial to the proper growth of the desirable organisms in the activated sludge. In any case where the supernatant or digester sludge is added to an activated sludge plant it is advisable before such addition that the digester supernatant be aerated for several hours separately or mixed with some activated sludge from the final clarifier and aerated together, before it is applied to the regular aeration basins of the plant.





• CUT-AWAY view of the rat cafeteria described herein.

ALL-YEAR RAT CONTROL FOR A PUBLIC DUMP

L. B. KELLY

Solvit Chemical Company,
Madison, Wisconsin

WEEK after week the superintendent of public dumps in Madison, Wisconsin reports "no rat activity during the day"—and, unbelievable as it sounds, "no rat activity at night."

This amazing control is the direct result of a plan which we, as professional exterminators, have devised especially for treating public dumps.

When pest control operators carried on annual rat control campaigns on the five public dumps at Madison from 1940 to 1951, the total annual cost to the city was \$1000. This was for one baiting; it gave control for a very short time. In comparison the charge to the city of Madison was very low in reference to other dump exterminations carried on in the surrounding cities.

Compare this with the total cost for 1951, which was \$479.40. Then remember that this drastically reduced expenditure gave the city 24-hour-a-day, 365-day-a-year control. This is something never before

important developments: (1) The rodenticide, warfarin, discovered at the University of Wisconsin; and (2) The development of a special outdoor bait container for warfarin which we have called "Kelly's Rat Cafeteria."

After conducting extensive tests and observing the characteristics and potentialities of warfarin bait, we sought to adapt the bait to practical use on city dumps, long a challenge to all professional exterminators. Using the old method

total expenditure of \$12,000 a year. This, of course, could not be justified for rodent control work.

Warfarin, unlike other poisons, is a slow killer and must be readily available to the present rodent population and any others that might invade the area. A small amount of warfarin is mixed with freshly ground corn, or some other type of dry grain, then made available to the rats and mice. The warfarin, taken in small doses over a period of 5 to 14 days, causes fatal



• RATS and more rats can be found around most garbage dumps.



achieved. In providing this control for less money, we firmly believe that we have developed a practical method for elevating public sanitation standards.

Success Elements

The success of our round-the-clock campaign is based upon two

of dispensing bait by hand every 30 days makes rodent control on dumps a very costly and, often-times, an ineffective procedure. If for example we were to take charge of the dumps in the city of Madison by such a method, it would mean a

hemorrhage. No pre-baiting is necessary. If the warfarin bait is palatable and attractive, rats and mice will continue to eat it right up to the time of their death. Warfarin cereal baits never freeze up, so they can be used all winter long.

Protecting the Bait

We knew that good protection would be required for the cereal bait mixture, and that drinking water should be made available close to the bait during warm weather. With these considerations in mind, and using other recommendations from the U. S. Department of Agriculture, we designed the Kelly's Rat Cafeteria.

The rat cafeteria is an all metal, weather-resistant feeding station with enough space for several months supply of warfarin bait. It is an automatic, no-clog, dispensing unit, with space for water in a special automatic protected drinking fountain. It is made of heavy-gauge weather-proofed steel, 2 ft. square and 18 ins. deep, and holds 60 pounds of bait. The unique hopper arrangement, incorporating a feeding trough with a bent lip, prevents the wasting of bait and makes it possible to place enough bait in one station to last for 60 to 90 days without replenishing. Its portability facilitates moving it from one area to another.

Typical of the Madison dumps which we treated was the Olin Avenue dump in Madison, a large dump covering an area of approximately three square blocks. First, we made a careful survey to determine the areas of heaviest infestation. Numerous rats were visible in the daytime, and periodic checks at night with high-powered lights showed great activity.

Method of Operation

After determining the logical baiting areas, we placed four large rat cafeterias, each with 60 pounds of warfarin bait and three gallons of water. More cafeterias would have been placed if garbage had been present. Bait consumption was checked periodically and it was found that the bait was taken steadily for six months. Consumption dwindled from 250 pounds during the first month to about five pounds for the sixth month.

A weekly check with the dump keeper showed that excellent rodent control was being achieved. There was no day activity, and no rats were seen during a two-hour period at night. For the first time, the dump had actually been controlled. Four rat cafeterias are still in use, each one operating on a single filling after control was obtained.

The cafeterias have been on the dump for approximately one year.

Bait consumption varies from month to month. In one week, for example, it increased to 10 pounds per cafeteria. The location of the dump accounts for the increase. There are similar dumps approximately 10 blocks away from which there is a migration of rats to the Olin dump. The dump keeper has seen numerous rats invading the area late at night. In front of the Olin Avenue dump a three lane highway separated another dumping area that has not been treated with cafeterias. Almost every night lights from cars travelling these highways would show up numerous rats travelling across for feeding purposes, thus proving the worth of the cafeteria method of rodent control. Rodenticide is available for this new migration 24 hours out of the day.

The expense of this type control is limited to the cost of refills and the monthly inspection by the dump keeper and other personnel. It is feasible, therefore, to control a large dump for a yearly outlay of \$25 or less. This provides 100 pounds of warfarin refill per year.

The cost of maintaining the all-metal rat cafeteria is negligible. Under normal circumstances, annual painting is the only maintenance required. The cafeterias are easily cleaned by dumping upside down before refilling. Our testing indicated that two cafeterias should be used on a dump having an area of one or two blocks. We add one cafeteria for each additional block area. As the dump reaches control it is advisable to transfer some of the cafeterias to dumps having a heavier infestation. The rat cafeteria's portability makes this an easy task.

The availability of water in warm weather has proved to be a very important factor in obtaining control. Tests have shown that rat cafeterias equipped with a water supply attract 30% more rats than those not providing water.

After reducing the rat population of the Madison city dumps drastically, our cafeterias are now controlling reinfestation day after day with a minimum amount of labor and money. Use of the proper warning signs has been highly successful in discouraging vandalism, as none has been reported in one year of test; and the inherent safety of the padlocked bait boxes protects inquisitive pests and humans.

So successful is the large size rat cafeterias that we now have a junior model—a six pound capacity unit

for farms, business places, homes, and other places subject to rat and mouse infestation.

It now costs less than 2¢ to kill a rat, but \$20 to keep him!

Special credit must be given to James Clarke, Madison Board of Health, and to Clarke Richards, educational director of the Wisconsin Alumni Research Foundation, for their cooperation in the development of the cafeteria devices.

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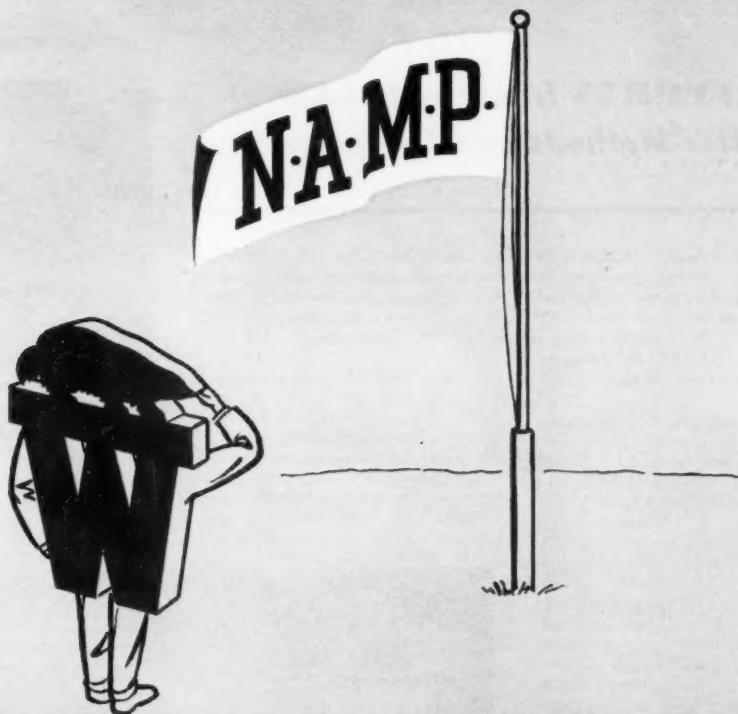
Brine Contamination of Streams

Harmful effects of brine wastes in river waters can be grouped into three main classes: 1—effects on water quality; 2—corrosion effects; 3—physiological effects on health. There is also a loss of natural resources because the industries discharging the brine to the river, fail to utilize the raw brine fully. An extreme instance of pollution of a river by wastes produced in the manufacture of chemicals from salt brine is presented by the Muskingum river in Ohio. A study of this has been conducted by the Ohio Valley Water Sanitation Commission, and the results published recently in a report—"Brine Contamination in the Muskingum River."

Comparing average concentrations of mineral ions in that river and in a tributary which does not receive brine wastes, the investigators found, in the polluted and unpolluted streams, respectively: chloride, 817 and 10 ppm; Calcium, 321 and 57 ppm; Sodium, 253 and 15 ppm; Total hardness, 894 and 219 ppm. Cities along the brine-polluted stream are unable to use it as a source of public water supply, and have resorted to wells, but even these are affected, apparently, by infiltration of the contaminated river water.

The U. S. Public Health Service has set 250 ppm as the chloride limit for drinking waters to be free of brine taste. The disadvantages of hardness in public water supplies are well known.

No method has been discovered for treating brine wastes. The most promising outlook is for eliminating or greatly reducing them by changes in manufacturing processes, or by underground disposal into strata sufficiently large and pervious and located below sources of well water in the area.



WOLVERINE TUBE SALUTES THE N.A.M.P.

The National Association of Master Plumbers—one of the oldest trade organizations in the country—holding its 70th Annual Convention this June—deserves a big hand for its many worthwhile accomplishments. A good share of the responsibility for the high standards enjoyed by the plumbing industry goes to the NAMP.

We are happy to recognize publicly the progress made by this association during its seven decades, and wish it every success in the years ahead.

Let us take this opportunity, too, to thank you—as individual members—for your patronage through recognized wholesalers. We assure you that we are doing our best to supply them with products for your use.

When you are attending the NAMP convention on June 2-5, 1952, in Atlantic City we would like to welcome you at our booth 760-761. Our exhibit is one of the many ways that Wolverine Tube is helping your wholesaler to merchandise the quality products he carries. Specify Wolverine tube and **BUY FROM YOUR WHOLESALER.**

WOLVERINE TUBE DIVISION

Columet and Hecla Consolidated Copper Company
Incorporated

Manufacturers of seamless, nonferrous tubing
1451 Central Avenue • Detroit 9, Michigan

Visit our Booth
Nos. 760-761

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Better Methods and Equipment

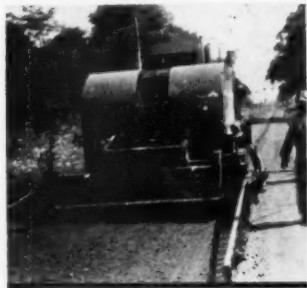
THE TRUCK-MOUNTED air compressor, without question, is our most useful piece of special equipment on all field work. We have a 210-cu. ft. LeRoi and like it very much.—Charles G. Bourgin, Sup't. and Engineer, Montclair, N. J.

IMPROVEMENTS IN Binghamton include four new 2.5 mg prestressed concrete tanks, 16-inch extensions and improvement of 20-inch river crossings to give better service across the Chenango. The Court St. pumping station was changed from steam to electric and this now includes seven Allis-Chalmers and one Delaval pumps. Five telemeters have been installed which will transmit reservoir levels to the Court St. pumping station. Pipe line analyzers were used in establishing levels in the reservoirs. If construction prices lower, the city will proceed with a new 16 mgd filter plant to replace the present 50-year old plant.—Grover E. Rickard, Sup't. of Water, Binghamton, N. Y.

WE USE OUR ½-yd. Osgood ditcher for many jobs, including cleaning ditches, installing culverts and driving piling. We have recent-

ly added an HD-5 Allis-Chalmers front-end loader and a Mall power saw of the chain type.—R. N. Forsberg, Highway Engineer, Jackson, Minn.

MOST USEFUL new equipment last year was a Ford tractor with front-end loader and Sherman digger. This has eliminated 80% of the hand digging on which our larger backhoe couldn't be used because it lacked the necessary mobility. The Ford unit was also used over the week-ends for clean-



● **MOTO-paver mixes and lays in one operation.** Vern Brown is road supervisor, Randolph Co., Ind.

ing sludge beds at the sewage disposal plant.—W. R. Gelston, Superintendent of Water Works, Quincy, Illinois.



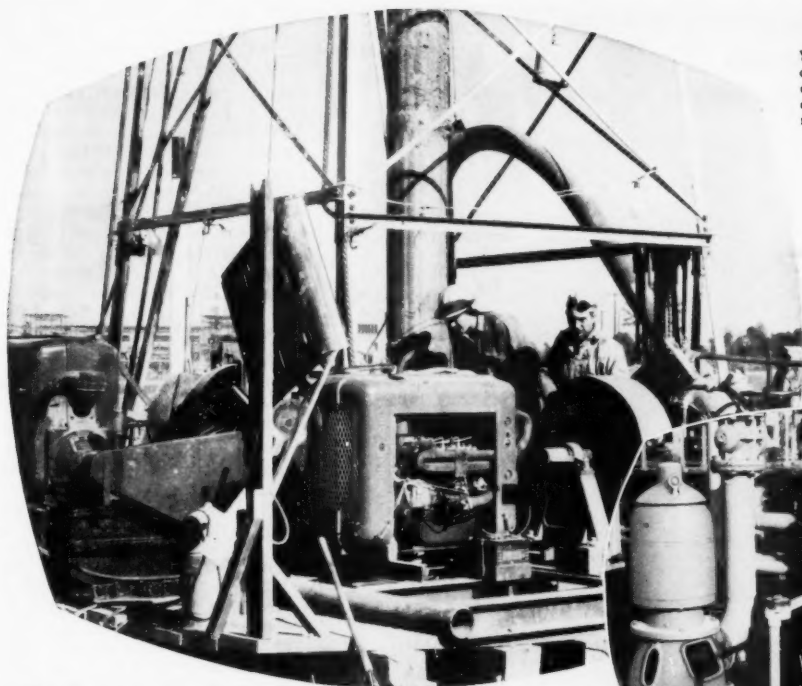
● **EARTH augers have been very useful in Alameda Co., Calif.**



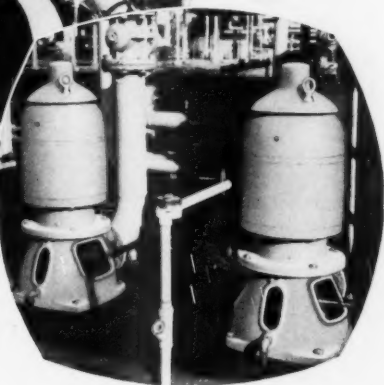
● **FRONT-end loader, AC HD-5, used by Jackson Co., Minn.**

OUR SMALL POWER rollers have been most useful in plant-mix patching by our maintenance crews; but it is hard to single out the best individual unit, considering the scope of our operations. Much of our work is in suburban areas where residential development has been intensive during the past few years. We have found the McCulloch 9-inch earth auger very useful.—Wallace B. Boggs, County Surveyor & Road Com'r., Alameda Co., Calif.

LAI D 5,000 FT. of 10-inch cast iron pipe with mechanical joints, using a Barber-Greene ditcher, Caterpillar bulldozer for backfilling, McCabe-Powers winch truck with derrick for handling pipe and fire hydrants, and an air compressor for testing mains and joints. Our job worked like a production line.—H. L. Morris, Commr. of Utilities, Blair, Nebr.



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our booths—89 and 90—
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at Kansas City, May 4
to 9.



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Before a single rig is placed, Layne has used a lot of know-how planning, plotting and figuring out such things as; what size casing and what depth it is to be set, what kind and how much sand screen to use, what kind and size shafting to use and how much horse power the motors should have to produce the stipulated amount of water against a certain indicated pressure. Once all of these answers are on paper, they

must be transmitted into an underground construction project—a task that requires more than ordinary skill and ability.

But whether for a single unit or many, you may be sure that if installed by Layne, all will have the same peak efficiency, operate with precision smoothness and be of utmost dependability for now and the years to come.

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Now's the time to mail this month's Readers' Service card.

**"Our Hydra-Lift has replaced a much larger,
more expensive crane
on this pipe stringing job,"**

says Mr. James B. Ramsey, Chief Engineer and Superintendent,
Municipal Water Works, Kansas City, Missouri



The Kansas City Water Department, in the construction of a new water main in Kansas City, North, is using a Pitman Hydra-Lift to load and string more than 7 miles of 16 and 20 inch cast iron and concrete pipe. The pipe weighs up to 3,600 pounds per joint.

Formerly, the water department shuttled a large mobile crane back and forth from pipe yard to job site to load and string the heavy pipe. Now they have a Hydra-Lift mounted on a tractor-trailer, and this single unit does the loading, hauling and stringing that formerly required two pieces of equipment. "It's the most economical way I know of, and I don't know where else we could get as much lifting power for the money," Mr. Ramsey says in regard to the Hydra-Lift.

The Water Works owns a second Hydra-Lift that is mounted on a 1½ ton flatbed truck. It is in daily use for pickup and delivery of pipe, valves, and fittings, and for setting hydrants. They expect to buy a third Hydra-Lift soon.

Because Hydra-Lift is a versatile truck-mounted crane that combines lifting power with mobility, it has become an important working tool for contractors, municipalities, utilities and others all over the country. It is easily mounted on the frame of any truck 1½ tons or over. The hydraulically-powered boom swings in a complete 180-degree arc and lifts through an arc of 100 degrees; boom telescopes from 12 to 17 to 22 feet. Lifting capacity is 6,400 pounds.

Chances are, you're doing some job right now that you could do faster and cheaper with Hydra-Lift. Write today for full information on this new inexpensive truck crane.



PITMAN MANUFACTURING COMPANY
300 West 79th Terrace Kansas City, Missouri

Get full details of this month's new products . . . mail your Readers' Service card today.

IN LAYING A 20-inch cement lined cast iron pipe through a swamp for a distance of about 500 ft., the work was scheduled for Feb. to take advantage of frozen ground. A P & H power shovel with backhoe was used to excavate and backfill. This equipment had to be floated on hardwood pontoons. Two Homelite portable pumps, 2-inch and 3-inch, kept the trench free of swamp water. All of our trench excavation is normally done by backhoe, rock excavation by air drills and backfilling by bulldozer and grader.—Garner C. Tripp, Jr., Sup't. of Water, Glens Falls, N. Y.

A LEAK WAS reported during the winter when we had 3 ft. of frost. Our M-Scope leak detector found three leaks instead of one, saving us plenty of hard work in comparison with the old method of digging until the leak was found.—Walter Van Brocklin, Superintendent, Gloversville, N. Y.

CHANGING THE SAND and gravel in one of our largest slow sand filters was the major project in our department during the past year. About 750 tons of sand were removed and discarded, and replaced with 1,000 tons of new sand. A sand ejector was used for removal and replacement. The gravel under-drainage was removed using a small Gravely tractor, hauling a trailer of our own design which held about half a ton of gravel.—C. Gordon Rahm, Water Department Manager, Iilon, N. Y.

IN CLEANING OUT, the silt dam above our main reservoir, we used a ¾-yd. Lima shovel, 2 Koehring bottom dump wagons and one TD-9 bulldozer for leveling off the fill. Most of our trenching has been done by renting a ½-yd. Bantam truck-mounted backhoe. — Charles W. Rich, Ass't. to Sup't. of Public Works for Water and Sewers, Ithaca, N. Y.

A SMALL MAINTAINER is attached to a small tractor for maintaining 3-ft. shoulders. This unit has a 4-ft. pull-in blade and a 6-ft. return. We also recently purchased a Lull front-end loader with a ¾-yd. bucket. During the summer we use it for pulling our pulvimixer and for loading materials when cutting shoulders. In the winter we mostly use it for loading sand and cinders.—Leon Morrissey, County Highway Commissioner, Oshkosh, Wis.

a message to men
responsible for municipal
water service . . .



MUNICIPAL water service can usually be judged by customer satisfaction. Low and variable pressures and high water bills naturally bring complaints. They should because — almost without exception — these faults can be corrected.

A universally accepted method of providing better municipal water service is with Horton elevated tanks. Properly located, they can reduce pressure variations throughout a whole city. Elevated storage also provides low pumping costs and often a better fire insurance rating.

Horton elevated tanks are of welded steel construction to assure lower maintenance costs. Peri-

odic inspections and repainting are sufficient to help keep them in good condition.

Horton elevated tanks with radial-cone bottoms are built in standard capacities from 500,000 to 3,000,000 gals. Standard sizes for ellipsoidal-bottom tanks range from 15,000 to 500,000 gals. Information or quotations may be obtained by writing our nearest office. There is no obligation.

Pictured above is a 1,000,000-gal Horton elevated tank recently built for Muskegon, Michigan. It complements an existing 1,000,000-gal. Horton elevated tank already in service. These structures are built in accordance with AWWA specifications.

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Detroit 26 1536 Lafayette Bldg.
Houston 2 C & I Life Bldg.

Los Angeles 17 1508 General Petroleum Bldg.
New York 6 3316-165 Broadway Bldg.
Philadelphia 2 1648-1700 Walnut St. Bldg.
San Francisco 4 1525-200 Bush St.
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Tulsa 3 1641 Hunt Bldg.
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WE HAVE purchased but not yet used a Henry backhoe mounted on a Le Roi Tractair. We believe this will be very effective in our work.—R. C. Dwyer, Sup't., Atlantic, Iowa.

A HUBER MAINTAINER and an Austin-Western gutter broom enabled us quickly to clean up dirt, gravel and debris deposited on our streets from adjoining areas by an unprecedented rain storm. The maintainer with front-end loader also enabled us to clean up several blocks where Bermuda grass had overgrown curbs and dirt had cov-

ered them. The maintainer did the work in about one-eighth the time that would have been required by hand labor. The sweeper is also a great help in keeping gutters clean and thus discouraging the growth of weeds and grass.—R. W. Stiles, City Engineer, Alamo Heights, Texas.

EQUIPMENT USED includes a backhoe for laying 12-inch and larger water mains; a Cleveland trencher for smaller mains; a bulldozer and a loader for backfilling and grading; radio equipment from



• CANTON, O., uses trencher and much other equipment.

car to car and office to field for better communication; gasoline driven air compressors for field work; and electrically driven air compressors for shop and meter cleaning devices.—Ralph Schlott, Supervision of Distribution, Canton, Ohio.

DURING COLD WEATHER we had trouble and lost time due to battery failures on our gravel pump motor, which is a 32-volt system. We acquired a used Delco generating set—very cheap since REA days—and our troubles have been solved.—Henry Graff, County Engineer, York Co., Nebr.

WE HAVE PURCHASED a great deal of new equipment this year and will purchase more next year, probably including a roller and a shovel, $\frac{3}{4}$ or $\frac{1}{2}$ yd., mounted on rubber. Also on the list for the future is a distributor, a crawler tractor, a small oil mixer and additional trucks. At the invitation of the County Surveyor, who is responsible, a 4-man civilian board of men familiar with construction equipment, will sit with him to choose those items of maximum use and value to the county.—George D. McCarthy, County Surveyor, Butte, Mont.

A TWO-WAY radio system has recently been installed by our department. Our motor patrols are perhaps our most useful equipment. We use them for blading, stabilizing, snow removal and backsloping.—J. H. Dupont, County Highway Engineer, Morris, Minn.

A TRACTOR AND SHOVEL loader, an Allis-Chalmers HD5, has been used for removing and repairing portable culverts, cleaning ditches, loading gravel and other materials, removing trees, clearing stumps and brush, and removing snow.—J. S. Wagnild, Highway Engineer, Cottonwood Co., Minn.

NOTES

for the engineer's note book

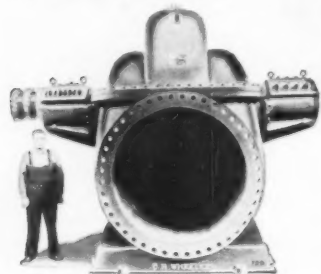
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UP TO 90,000 GPM CLEAR WATER CAPACITY with Wheeler-Economy Horizontally-Split Case Double-Suction Centrifugal Pumps

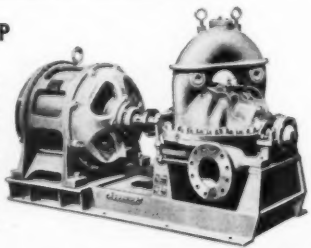
Wheeler-Economy Double Suction Pumps have records of outstanding dependability in handling clear water or other liquids of low viscosity at moderate pumping heads. These pumps are of the most modern hydraulic design, resulting in high operating efficiencies with little maintenance and long life.



Single stage, double suction, split case design in sizes from 11½" to 54". For detailed features, see CATALOG A750.

"HIGH HEAD" IN A COMPACT PUMP Two Stage Type DMD

Heavy duty, high efficiency with opposed impellers and horizontally split case. Sizes 2" to 10" for capacities to 4,000 GPM and heads to 750 feet. Wheeler-Economy DMD Pumps are used in high head water works applications, buildings, hydraulic elevators, boiler feeding, mines, etc. See CATALOG C351.



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• **SCYTHETTE** is handy for mowing in tight places.

AN ATHEY FORCE feed loader and an Austin-Western 99M grader are used on all of our county roads and they do a beautiful job, and one that lasts. Recently we bought a 1/2-yd. Bucyrus-Erie diesel shovel and an International tractor-bulldozer.—C. H. Proctor, County Road Engineer, Shelbyville, Ky.

A 3/4-YD. SHOVEL was used to change the course of Salt River, a small stream, for a distance of half a mile in order to eliminate the need for constructing three bridges. About a thousand feet of this excavation was in solid rock to a depth of 6 ft. —D. M. Humble, Road Engineer, Danville, Ky.

AN ALL-AROUND handy piece of equipment is our D2 Caterpillar diesel tractor with end loader attachment. We use it for cleaning side ditches, excavating for and installing cross-road and entrance culverts and loading materials.—S. C. Campbell, County Superintendent of Highways, Mt. Carroll, Ill.

WE PURCHASED a Schield-Bantam 3/4-yd. dragline in Feb., 1951. During the summer, it was used to rebuild or repair more than 50 bridges of all types and has handled piling up to 45 ft. in length. For maintenance work, we have developed a 4-man crew with two maintainers, a Seaman Pulvi-mixer and a rubber-tired roller to recondition our oiled roads.—R. S. Clay, Jr., County Engineer, Shelby Co., Iowa.

OUR FRONT-END loader, a Lull on a Minneapolis-Moline tractor, has proven to be a very useful tool and we would not be without one, but our motor graders are our most used equipment for summer and winter maintenance.—J. S. Schmit, County Engineer, Hallock, Minn.

Spent Sulphite Liquor as a Road Binder

SULPHITE liquor is a by-product of paper making from wood pulp, and its disposal offers a considerable problem. In Wisconsin, it has been used with some promise as a road binder and its use for such purposes was discussed in a paper before the League of Wisconsin Municipalities by Groff Collett, William Herriott and W. A. Sherman. In an effort to learn the results users had been obtaining, ques-

tionnaires were sent to 55 road officials, from whom 25 replies were received.

In summary, these showed considerable satisfaction with sulphite as a road binder in those areas where clay or silt soils predominate. In such areas it has abated the dust nuisance, conserved surface materials, and reduced or eliminated the need for blading maintenance. In sandy areas, methods to produce equally satisfactory results have not been developed, and it is the opinion of the authors that beneficial effects,



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FLEXIBLE BOLTED CONNECTION

M & H Mechanical Joint ends on gate valves are identical with mechanical joint standards adopted by the Cast Iron Pipe Research Association. It uses the stuffing box principle, by which a thick gasket is compressed into a stuffing box by a bolted gland or follower ring. It is a flexible, bottle tight joint, easy to make, and economical. Mechanical joint making in the field does not require a skilled workman. Mechanical joint permits deflection in any direction, also longitudinal expansion and contraction.

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GO TO THE ROOT OF YOUR WEED
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DOLGE SS WEED-KILLER

Where no vegetation whatever is desired such as your parking places and walks. Penetrates deep down to plant roots and kills. Sterilizes the soil, preventing normal sprouting of wind-blown seeds. Weeding the thorough, modern chemical way eliminates backbreaking toil and saves the cost of many labor-hours.

E.W.T. SELECTIVE WEED-KILLER (2-4-D)

The efficient way to control weeds on your seeded areas. Works its way down into the roots of brush, dandelion, plantain, poison ivy, ragweed, sumac and other obnoxious plants, but does not injure most turf grasses.

Dependable
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Know
where
YOU'RE GOING ?

Even a blindfolded ditching or excavating machine operator will find the pipe —when he breaks it! . . . To be safe, use the efficient, economical Detectron "505." It finds the pipes and cables first—with speed, pinpoint accuracy, greater depth and positive location . . . Throw away the blindfold—get a new, improved "505" . . . you'll never regret it!

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Get Year 'Round RAT CONTROL On Public Dumps with KELLY'S RAT CAFETERIA



Cutaway view
shows food hopper
and water fountain

SAFE-CERTAIN-ECONOMICAL

Here is the proved, lowest-cost system for rat control in infested areas such as public dumps. Kelly's Rat Cafeteria is a portable, hopper-fed feeding system with an exclusive device which prevents bait waste. Hopper holds several months' supply of warfarin bait. Two-gallon automatic water fountain included. Made of heavy-gauge steel. Easy to clean. Padlocked for safety. Size 24"x24"x18".

Kelly's Rat Cafeteria comes complete with 50 lbs. of Kelly's warfarin rodenticide. \$39.95 (f.a.b. Madison)

\$39.95

Write Dept. A for complete information and quantity prices.

SOLVIT CHEMICAL COMPANY
SPEEDWAY ROAD • MADISON, WISCONSIN

with sand or cinders, do not persist much beyond the first heavy rain.

A problem in the use of this material lies in the fact that it is 10% solids and 90% water. Thus economical shipping distances are limited. Concentration of the product is possible, thus reducing transport cost, but this increases the cost of the product.

Methods of Application

There are probably as many different methods for applying sulphite roadbinder as there are mills distributing it. However, certain broad principles are observed by all successful operators. These are:

a. The road surface should be loosened and graded prior to application of the roadbinder.

b. The sulphite roadbinder should be flooded onto the surface between windrows on the road edges. Successive applications should be made before the preceding application has had an opportunity to dry out.

c. Sulphite roadbinder can be most effectively used on roads of certain make-up. Best results are reported from roads containing a large portion of clay or silt. Benefits from sulphite roadbinder applied to roads containing only sand or cinders will last a much shorter time.

The quantity of roadbinder to apply depends on the results that are desired. On a soil with a good gradation a single application of 0.7 gallon of 10% liquor per square yard gives temporary relief from dust. Where a more permanent surface is required 3 applications or a total of approximately 2 gallons per square yard are recommended. Once this heavy treatment is given it has been the experience that in succeeding years a single application is sufficient to stabilize the road for the entire season. As more sulphite roadbinder is added it penetrates deeper into the surface and tends to build up a well stabilized sub-surface.

After several seasons of sulphite treatment a road should be well suited for black topping. Experiments have been concluded in the Park Falls area with favorable results. After ½ mile of a 4½ mile road had been thoroughly stabilized with sulphite roadbinder, the whole road was black-topped during the next summer, 1948. A 1¼-inch mat of slow cure oil was used. After 2 years the part of the road which was not stabilized was broken and rippled so badly that about 50% was laid again, but the sulphite-stabilized section has never required re-laying. This past spring,

which is the third year, the unstabilized portion had to be heavily patched and at the same time a little patching was done on that section of the black-top which has the sulphite-stabilized base. At the present time the black-top with the stabilized base is in better condition than where it was not stabilized, even though the unstabilized portion has had considerably more repair. The whole road had the same general type of soil, drainage, and gravel. The conclusion of the local road authorities is that the sulphite-stabilized base accounts for the entire difference.

"We are frequently asked whether sulphite roadbinder causes any damage to metal, paint or rubber, after it is applied to the road. The answer is "no". The liquor as it comes hot from the mill is mildly acid, principally from acid gases that it carries in solution. While it is hot, spent sulphite liquor must be handled in acid resisting materials. Most of the residual acidity evaporates as the roadbinder is sprayed from the truck. All remaining acidity is neutralized by the alkalinity natural in the road material."

Maintenance Equipment

(Continued on page 67)

Caterpillar D-7, and IHC TD-18) and none of them is larger. This size tractor is also used with an 8-cubic yard struck capacity scraper on betterment and construction. We buy a number of 100-HP motor graders and now have a total of 228 that are less than 3 years old. We think this unit can be used advantageously and economically on maintenance and construction.

Cost of Equipment

The main difference in the cost of using a 100 HP motor grader and the cost of using a smaller motor grader is the charge for depreciation. Since the life of the large motor grader will be longer than the life of the small motor grader, the difference in the hourly depreciation cost of the two units when used on light work should not be excessive. The operator's wages for each size will be identical, at least in North Carolina; fuel and blade cost will be approximately in proportion to the work performed with either size motor grader and the repair or maintenance cost on the larger motor grader should be less per unit of work per-

formed. An estimated comparative hourly depreciation cost will be approximately as follows:

(1) 100-HP (24,000 lbs.) motor grader at \$10,200 first cost and at an estimated economical life of 8 years, or 16,000 hours ($\$10,200 \div 16,000$) will give \$0.64 per hour.

(2) 50-HP (14,000 lbs.) motor grader at \$7,000 first cost and at an estimated life of 7 years or 14,000 hours ($\$7,000 \div 14,000$) will give \$0.50 per hour.

(3) 35-HP (8,000 lbs.) motor grader at \$4,800 first cost and at an estimated life of 4 years or 10,000

hours ($\$4,800 \div 10,000$) will give \$0.48 per hour.

On this basis, the difference in hourly depreciation cost between the 100-HP and the 35-HP units will be \$0.16. The "first cost" prices are the actual low bid prices at State Highway lettings in June, 1951. The "estimated economical life" seems reasonable. The larger unit (100-HP) will probably be in use 10 years plus and the smaller unit (35-HP) will possibly be in use 7 years plus.

However, it is evident that there is a place in the maintenance pro-

HOW YOU CAN GET NEW PIPE EFFICIENCY

FOR

OF THE COST OF
LAYING NEW PIPE



24" Main before clean-24" Main after clean-
(C valve 69) (C valve 134)

Coater in 24" main 24" Main after coating

THE PITTSBURGH-ERIC PROCESS FOR RECONDITIONING — 3" TO 24" WATER MAINS IN PLACE

FAST: Up to 1000 feet of pipe can be cleaned and lined in ONE DAY

EASY: Corporation cocks, valves and fittings do not have to be removed. The pipe can be cleaned and lined even though corporation cocks extend through the wall of the pipe.

CONVENIENT: Customers can be supplied with water at all times, if desired, while reconditioning work is going on. Under other conditions, the speed of application keeps inconvenience to users at a minimum.

SAFE: The Pittsburgh-Eric Process leaves the pipe free of contamination. No taste or odor is imparted to the water; a brief flushing period with clear water leaves the pipe ready for use.

EFFICIENT: As the lining is usually applied to a thickness of $\frac{1}{16}$ inch and never more than $\frac{1}{8}$ inch, little valuable cross-sectional area is lost. The smooth lining, permits a flow coefficient value close to that of the pipe when new.

LOW COST: Depending on the area, the cost of reconditioning by the Pittsburgh-Eric Process is only 25 to 40% of the cost of laying new pipe.

LONG LIVED. The lining material, LECTUMEN, used in the Pittsburgh-Eric Process has high resistance to water and the chemicals used in water. More than ONE MILLION feet of pipe, reconditioned by this process ten or more years ago, is still giving efficient service.

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gram for a limited number of motor graders smaller than the 100-HP. In my opinion, it is not advisable to buy a motor grader smaller than a 50-HP diesel, 14,000 lb. unit. Our preference is for tandem drive even in this small size unit (50-HP). The tandem drive is preferred because of its flexibility and in spite of the fact that equal traction can be obtained at a lower first cost with a single drive unit. We have on inventory 70 patrol graders rated at approximately 35 HP. These small motor graders are used a smaller percentage of the time than the

large units and the small unit is often unintentionally abused by operators and foremen trying to do work with the motor grader that is too heavy for the capacity of its component parts.

Maintenance of soil type and unpaved roads by drawn type graders and all-wheel-drive trucks or wheel tractors, which was standard and essential procedure until approximately 3 or 4 years ago, is rapidly being replaced by maintenance with motor graders. This change is taking place because the motor grader does a more satisfactory job at a

lower cost and because the drawn type grader is becoming less available and almost non-obtainable.

Loaders will follow close behind the crawler dozers and the motor graders as labor savers and as essential units. We have all types of loaders and each type has its place—force feed, front-end crawler type, front-end wheel type, and bucket elevator type.

While each type loader has a place our men prefer the force feed type, probably because of its capacity. It is adapted primarily for loading from a windrow. On a large percentage of our work the material to be loaded can be windrowed. It is difficult to keep enough trucks working with a force feed loader to keep the loader operating to capacity. This loader is exceptionally efficient in loading the excess material that has been removed from a side ditch by a blade grader (motor or drawn type).

The "front-end crawler type" is my preference for non-windrow loading except where the loading requires frequent moving and makes mobility of the loader an important factor.

• • •

FLUSHING SLUDGE LINES AT A SEWAGE TREATMENT PLANT

JOHN B. POWERS

Manager, Water & Sewer Systems,
Texarkana, Ark.-Tex.

THE lines from our primary clarifiers to our sludge pumps are longer than usual and at times flows are very sluggish. We inserted a one-inch corporation stop on the manifold at the sludge pumps and fixed an adapter that would fit our air compressor hose, then we turn the air on which does a very good job of flushing the lines from the pumps to the primary clarifier. As to the method of flushing the sludge lines from our intermediate and final clarifiers, we have a plate with a similar adapter that bolts on to our flange valve in our drain pumps. The reason we don't use water is because we do not wish to make a cross connection, and we would probably not have the volume anyway.

As to our experiences with a small ditching machine, I would like to say that we have a small Blackhawk trenching machine put out by the Arps Corporation, hooked up to a Fordson Tractor. This little ditcher has a seven-foot boom and

— SUPERIOR — PIPE-LINE HANDLING EQUIPMENT



Model
PBI-24C



AUTOMATIC RELEASE PIPE TONGS—
for easier, faster, safer pipe handling.

Here's a weight-lifting champion with a winner's record. Comes in several sizes — all designed to be used with International Harvester Crawler tractors. Up to 90,000 pounds lifting capacity.

Related Superior equipment includes blade back fillers, angle push blades, pipe dollies, blocks, etc.

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will dig a seven-foot ditch twenty inches wide, under favorable conditions, although at that depth and width, I must say that we have to have a man on each side of the ditcher to help throw the dirt back. We have had a little trouble with the chain, but only because our operators were new at the job and didn't keep it tight enough. We have broken very few blades. If we have a job too large for this ditcher, then it is also too large for our crew; so we make a contract job and let it out to some contractor.

Laying Large Pipe

(Continued from page 59)

avoids the danger of flying metal chips that accompanies the usual methods of cutting cast iron pipe with a sledge and cold chisel.

The cost of the transmission main and of the various feeder mains was slightly over a million dollars. This included the right-of-way, engineering, supervision, and contingencies. A special bond issue was sold to cover the cost; these bonds will be paid from earnings of the department. The cast iron pipe and fittings were sold by the American Cast Iron Pipe Company, and Mueller Company supplied the valves.

A new clear well costing \$270,000 has also been completed and placed in service. This new reservoir has a capacity of 4,000,000 gallons and brings the total clear water storage up to six million gallons at the lake-side station. J. L. Simmons Company, Inc., of Decatur, Illinois, were the contractors on the reservoir job.

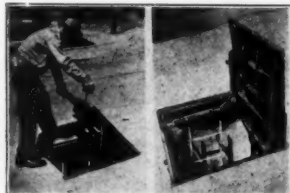
The city now has three transmission mains from the filtration plant on the lake to the city. A 30-inch main was installed in 1935 when the lake and filtration plant were built. In 1938, a 24-inch line was laid; and now the new 36-inch main is in service. It is hoped that these three mains will supply the demand for the next 25 years, but there may be another war, bringing in more heavy industries and requiring additional large amounts of water.

The 36-inch pipe was installed by Hastings and Stiers of St. Louis, and the 30- and 24-inch pipe was awarded to Middle States Construction Company. S. T. Anderson is general superintendent of city Water, Light, and Power Department.

Most Cities Prefer Large Motor Graders

A limited survey was made covering 200 cities selected at random throughout the country. The purpose of the survey was to determine the size of motor graders preferred by representative cities for street construction and maintenance. Of the 52 cities answering, 6 preferred motor graders of less than 50 hp; 5 preferred graders of 50 to 74 hp; and 41 preferred graders of 75 hp or larger. According to size of city, returns were: Under 10,000 popu-

lation, 8 replies, 1 prefers less than 50 hp and 7 over 75 hp. Population from 10,000 to 25,000, 11 replies, 2 under 50 hp, 9 over 75 hp. Population over 25,000 and less than 50,000, 11 replies, 1 under 50 hp, 3 50 to 74 hp, and 7 over 75 hp. Population over 50,000 and less than 100,000, 7 replies, 1 under 50 hp, 2 50 to 74 hp, and 4 over 75 hp. Population over 100,000, 15 replies, 1 under 50 hp, 14 over 75 hp. Though the extent of the survey was limited, the cities replying are so representative that results appear to be significant.



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PUBLIC
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DIGESTS

THIS section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are Bibliographies of all principal articles in these publications.

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THE SEWAGE AND REFUSE DIGEST

**Combining Incineration
And Land Fill**

The ash from most refuse incinerators in the United States is used for fill. For this purpose, total incineration of the organic matter in refuse is unnecessary. The volume of ash, and therefore of the area required for dumping it, can be reduced 80% to 90% in about one-third the time required for complete destruction of organic matter. Therefore the plant can be made much smaller. The Miami, Fla., plant, designed for 350 tons a day, is burning over 1,000 tons to an ash volume only about 25% of that of the material fed to it.

Further reduction in cost of about 50% can be made if it be planned to operate 24 hr. a day instead of one 8-hr. shift. Still further economy can be made by designing the incinerator capacity for ordinary amounts of refuse only, not for peak seasonal loads. Excess material from peak loads can be disposed of on fills, mixed or covered with ash. Heat utilization and salvage of salable materials can be employed to cover much of the cost of refuse disposal.

"You're Burning Dollars in Your Incinerator," *Engineering News-Record*, March 20.

**Landscaping
Sewage Works**

In landscaping the grounds of treatment plants, a park-like effect is desirable but it should not be the aim to turn them into public parks, but to make them and keep them looking attractive and tidy with a minimum of labor. For this reason, flower beds are rather out of place; they need a lot of attention to keep

them in good order, and if this is not provided they might better be omitted. The slopes and terraces between plant units at different levels provide good locations for flower beds, if they are used. For the main entrance road, grass borders two or three feet wide backed by flowering and ornamental shrubs are effective. Such shrubs can be used effectively at various places about the grounds, singly or in masses. If trees are planted, small varieties should be selected—crab-apple, thorn, laburnum, etc. Large size trees send their roots for considerable distances, clogging sewers and drains; their falling leaves are nuisances, especially on percolating filters; they interfere with the free flow of air over the sludge-drying beds. Trees, however, serve to screen the plant from view in built-up areas; and they and shrubs deflect air currents (with possible odors) upward and help to allay odors by photosynthesis and assimilate gases and give off oxygen.

H. H. Stanbridge—"Maintenance of Sewage Works Sites," *The Surveyor*, March 15.

**Compressing
Sewage Sludge Gas**

Two general types of equipment are available for the circulation and compression of such gas—blowers, to produce pressures up to 10-15 lbs., and compressors for higher pressures. Blowers are of several types: 1—Centrifugal and axial blowers, operate best at large capacities and moderate pressures. Single-impeller blowers have capacities from 500 to 100,000 cfm, and pressures from 1.0 to 6.5 lb. gauge pressures. Multi-impeller blowers have capacities to

150,000 cfm and 15 lb.; centrifugals deliver at constant pressure for a wide range of capacities; axials deliver constant capacity for varying pressures. 2—Two-impeller positive blowers, for 5 to 50,000 cfm and pressures to 10-15 lb.; for use with a wide variety of prime movers. 3—Sliding-vane type, sizes up to 5300 cfm and pressures up to 50 lb. if one-stage, 125 lb. if two-stage. Usually directly coupled to motor, engine or steam turbine. 4—Liquid-piston type, employs a low-viscosity liquid as compressant; develops up to 75 lb. pressure and capacity up to 5,000 cfm. 5—Reciprocating compressors can be used with any type of prime movers; require expensive foundations.

Edmund C. Powers—"Sewage Sludge Gas and Its Compression and Storage," *Wastes Engineering*, March.

**Treating Beet
Sugar Wastes**

The wastes produced in the manufacture of beet sugar are designated as flume water, pulp screen water, pulp press water, pulp silo drainage, lime cake slurry, lime cake lagoon effluent and barometric condenser water. The total amount per ton of beets averages about 7,200 gallons, with a B.O.D. of about 38 lb. The common damages to receiving water are oxygen depletion and sludge deposits. The problem of reducing pollution effects has been attacked mainly by changing the process rather than installing waste treatment systems. Remedial measures which have proven successful in varying degrees include elimination, segregation and re-use, and by-product recovery. The most successful of these will still leave mis-

cellaneous wastes, discharge from recirculation systems, and lagoon supernatant. The British Water Pollution Research Laboratory has reported satisfactory pilot plant treatment of lagooned beet sugar wastes by biological filtration. It was demonstrated that settled flume water was amenable to biological filtration and would consistently give a treated waste with a 5-day BOD less than 20 ppm.

Hayse H. Black and Gerald N. McDermott—"Industrial Waste Guide—Beet Sugar;" *Sewage and Industrial Wastes*, February.

Protecting Concrete Sewer from Gas

A trunk sewer is under construction in Orange County, Calif. which includes 42,000 ft. of reinforced concrete pipe. Its long, relatively flat grade will favor the production of hydrogen sulfide gas. To prevent this from attacking the concrete, the top two-thirds of the interior of the pipe is protected with a plastic material—"T-Lock Amer-Plate." This comes as sheets 0.06 in. thick which carry on the back T-ribs at 2½" intervals. This is fastened around the inner forms of the pipe molds

PUBLIC WORKS for May, 1952

and the ribs are embedded in the concrete when it is poured. The material is thermo-plastic, and is welded at the joints by use of a blow torch operating at about 500° F.

"Plastic Lining Protects Sewer;" *Engineering News-Record*, April 3.

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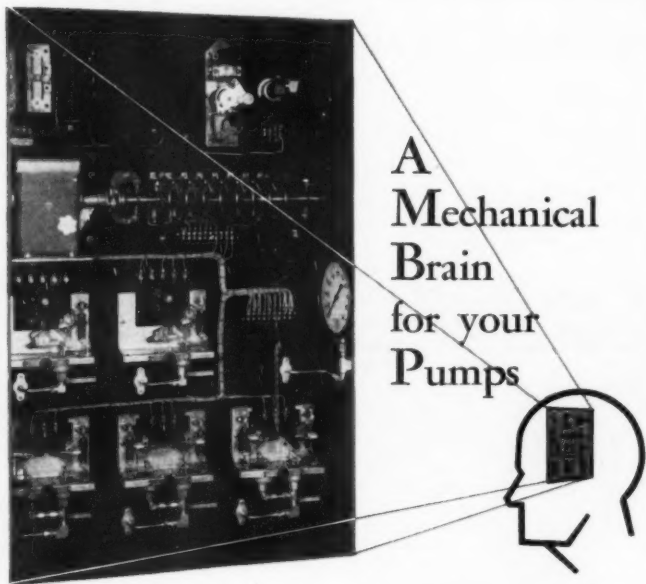
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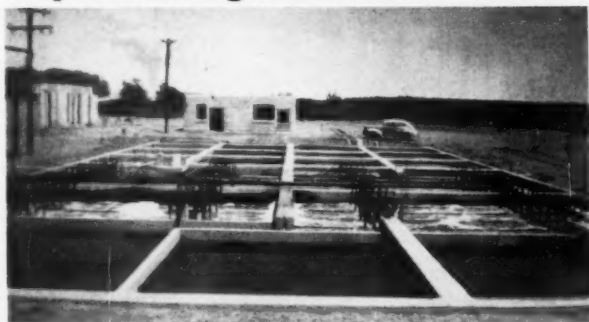
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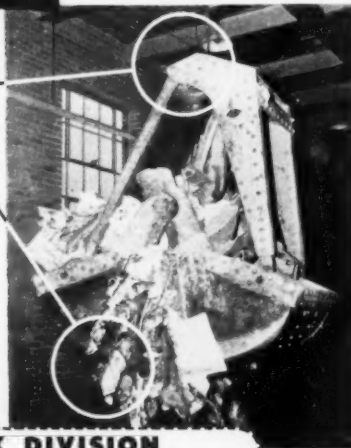
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Elevated Water Tank Reduces Pumping Load

In order to cut down daily pumping and treatment plant peaks, Atlanta, Ga., last fall completed a 2-million gallon radial cone type elevated tank. Prior to placing this tank in service, pumps were operated against a head of 120 psi, and pumping rates varied between 35 mgd and 105 mgd. With the tank in service, the maximum pumping rate necessary has been 85 mgd and the pressure has been reduced to 115 psi. Pressures in the distribution system now range between 40 and 50 psi as compared to a range of 25 to 50 psi previously. The elevated tank floats on the distribution system and fills at night.

The tank is 102 ft. in diameter, 90 ft. high to the bottom, and has a 35-ft. range between upper and lower water levels. The sixteen supporting columns are 54 ins. in diameter, and the central riser is 120-inch. The tank was constructed by Chicago Bridge & Iron Co., and is part of large scale water system improvements by the Atlanta Water Department, of which Paul Weir is General Manager. Wiedeman & Singleton served as consulting engineers on the project.

Suggestions for Designers of Sewage Plants

JOHN HURLEY is a well known and highly regarded expert in the operation of English sewage plants of various sizes and types. In a recent paper before the British Institute of Sewage Purification he offered suggestions for designers of sewage plants, with special regard to the operation of the plants, which they should, he says, keep continually in the back of their minds, and not too far back; at least the suggestions would serve as a valuable check list; as valuable in this country, or any other, as in England. Some of the more suggestive of these are given below.

The plant should be able to produce an effluent of the quality required by the sanitary authorities without creating a nuisance, particularly from odors and flies; for probably no plant will continue to be remote from neighbors. Do not rely on "prevailing winds;" both because they cannot be relied upon never to change direction, but also because the greatest nuisance occurs when there is little wind at all; then an odoriferous blanket may enshroud the neighborhood for a long time.

It is not sufficient that a plant give a good effluent at certain seasons or under favorable circumstances only. Both design and operation should be such as to minimize the possibility of serious deteriorations in quality. An occasional discharge of bad effluent may affect the receiving stream as seriously as a continuing one. Proper consideration should be given to preventing the discharging of polluted bed drainage, supernatant, or imperfectly settled effluent from final sedimentation tanks. One means of accomplishing this is to provide flexibility of operation, as by dividing each stage of treatment into a number of separate units, permitting use of alternative routes and methods of operation. Any mechanism is liable at times to require putting out of operation temporarily for repairs, lubrication or adjustment. It is asking for trouble to put all the capacity into one (or even two) large sedimentation tanks, or filters, or to provide only one sludge pump. Sooner or later—probably both—this will lead to trouble. Three of each is desirable, although it may not be practicable for small plants.

Maintenance should be made easy. A sewage works has to be kept in effective service all night as well as day, and in all kinds of weather. Some of the severest trials occur during the winter months, when daylight is shortest. Therefore adequate lighting must be included. Crucial points must be easy and safe of access.

It is especially necessary for small plants, which may receive little or no attention at night or during week ends, to be more fully automatic even than larger installations; and without recourse to delicate and

elaborate devices which would require much skilled attention.

For breaking in new plants, changing operating methods to meet new conditions, or extending our knowledge of sewage disposal, it would be desirable to arrange for parallel working of two units, differing from each other in only one respect, thus giving positive information on the influence of some one factor in full-scale practice at little if any cost.

At the beginning of planning, it is wise to consult with the management side of sewage purification

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(such as State Boards of Health), with operators of plants, and, if industrial wastes are involved, with chemists. If done preliminary to planning, this should obviate the possible necessity of having to make changes later.

The efficient removal of solids from final effluents is very important. Where an effluent of high quality is needed, the extra bit of purification might often be more cheaply and effectively attained by concentrating on the removal of solids from the effluent rather than by increasing the size and complexity of the earlier stages of treatment. Installing really efficient final settling tanks, or using sand filters, land irrigation, mechanical flocculation, or microstrainers, may be the best way of attaining the requisite standard of quality.

It is more or less common practice to return to the raw sewage the humus sludge, surplus activated sludge, supernatant from digestion tanks, and drainage from sludge beds. Surplus activated sludge may be so disposed of. Humus sludge returned to primary tanks sometimes causes sludge rising by production of gaseous nitrogen.

Supernatant may cause bubbling and septic conditions due to the presence of anaerobic liquor replete with organisms eager to cause gaseous fermentation. "I think we should look seriously into the question of giving these recirculated oddments a little treatment of some sort on their way back to the raw sewage, with a view to preventing them from upsetting the sedimentation tanks and hence the rest of the works. One possible solution would be to mix the various returned liquors in a common tank to permit them to kill each other. By this means, for instance, we might get the sludge liquor to destroy quickly the nitrate in humus sludge; a subsequent short spell of aeration might reasonably be expected to develop some anaerobic bacteria and possibly effect some flocculation. After this treatment, which would not be costly, these liquors might then be returned to the raw sewage, at a regulated rate if necessary, without detriment to the sewage purification process. At Wolverhampton we are expected in the near future to do some experimental work on this and other methods of tackling the problem."

Card Tells How to Orient New Employees

Glendale, California, has issued a card "How to Start the New Employee Right," designed for the guidance of supervisory employees in acquainting new employees with their jobs. Five main steps are set forth: Establish friendly relations; explain important rules and regulations; and explain pay system; acquaint new employees with location of various facilities and introduce him to fellow employees; and advise the employee about orientation conferences. Under the third step explaining the pay system, for example, the supervisor is advised to be sure that the new employee knows what his pay rate is (classification and standard rate), how he is paid, when he is paid, where he is paid, overtime work policy, step increases, and "that you will answer any pay questions that arise." The card, which was issued by City Manager Charles B. Briley, ends with the statement: "The first responsibility in the development of a satisfied and efficient employee is to make him feel at home when he starts his new job."—Public Management.

NEW IMPROVEMENTS

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Automatic Cable
Level Wind

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Mounted on four wheel trucks — safer — eliminates lifting to position over or pull away from manholes — safer tandem towing.

All Controls at Working End — keeps operator out of passing traffic — allows full vision of work.

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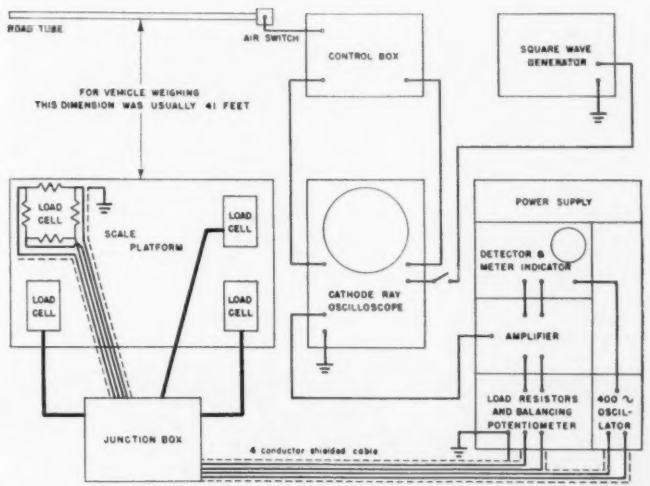
PUBLIC
WORKS

DIGESTS

THE HIGHWAY AND AIRPORT DIGEST

Mechanization of Highway Maintenance

Increased mechanism is considered by the Texas Highway Dept. as the principal answer to its problems. The maintenance engineer of one district has said that compared to five years ago, he is maintaining almost twice the mileage with 10% fewer men. Trucks are the backbone of the maintenance equipment; heavier units have replaced their 1½-ton dump and flat bed trucks. End loaders have contributed more to maintenance work than any other one type of equipment. Those with pneumatic tires are ideal for small, widely-separated jobs. Track-type loaders are best for heavy excavation on soft footing; they are transported on tilt-type trailers towed by dump trucks. For unloading, loading and hoisting, a 15-ton crane and ¾-yd. bucket is used. The heaviest pieces used for excavation are ¾-yd. track-type draglines and power shovels; work requiring heavier equipment should be done by contract. For cleaning ditches in wet soil a motor crane with an excavating bucket on a telescoping boom is used; for cleaning ditches in sandy soil, an excavation and conveyor loading attachment for motor graders; on one job a machine loaded 21 trucks of 4 cu. yd. capacity in 19 min. each, or at the rate of 265 cu. yd. per hr. Each district has several 100-hp motor graders; and the maintenance sections have 75-hp ones, and some 35-hp ones for spreading asphaltic concrete, blading shoulders and light ditch work. For maintenance work, 2-drum, 3-ton rollers with retractable wheels and towing hitch are replacing the old 5 to 8-ton flat wheel rollers. Each district has an up-to-date assortment of heavy asphalt equipment — distributors, heaters, spreader boxes, rollers, portable asphalt storage tanks. Purchases of equipment are made on the low bid basis, but careful preparation of



Courtesy Public Roads

● **ELECTRONIC scale for weighing vehicles in motion.**

specifications to eliminate products which are not suitable has removed most of the lemons.

P. S. Bailey—"Mechanization of Highway Maintenance," *PUBLIC WORKS*, April.

Weighing Vehicles While in Motion

This article describes the development of an electronic weighing device which can measure axle weights, axle spacings, and speeds of vehicles moving at their normal operating speeds along the highway. The device consists of a narrow, free platform built in the surface of a traffic lane and supported by load cells containing columns to which are affixed groups of wire strain gages. The weight applied to the platform by a vehicle passing over it produces changes in the electrical currents flowing through the strain gages, and these changes, through electronic equipment, are reproduced as a pattern of light on

an oscilloscope where they are photographed for record purposes.

A road detector tube, placed on the pavement at a predetermined distance in front of the platform, serves as a timing trigger for the sweep of the light spot across the oscilloscope, and from the recorded pattern not only axle weights but also axle spacings and the speed of the vehicle can be determined.

While the basic theory involved in the operation of this device is not unduly complicated, the experimentation and development work were beset with many electronic and structural problems. Many of these have been solved; others have been overcome in principle but are yet to be effected in practice.

For static weighing, the electronic scale is as accurate as the conventional lever-system pit scale. For highway-planning purposes, the electronic scale in its present stage of development is suitable for determining the frequency of different

axle and truck weights, axle spacings, and speeds of vehicles without interfering with their normal operation. For enforcement purposes, through the use of an electronic scale of this type it is possible to cull out trucks with axle weights or total weights approaching or exceeding legal weight limitations.

There is good prospect that the electronic scale will be so improved that its accuracy in weighing vehicles in motion will approach still more closely the accuracy already attained in static weighing. It is also probable that simpler and less costly electronic equipment can be designed, and an oscillograph may prove an adequate substitute for the oscilloscope and recording camera.

O. K. Norman and R. C. Hopkins
—"Weighing Vehicles in Motion,"
Public Roads, April.

Traffic Signs In Missouri

At the end of 1951 there were approximately 165,000 traffic signs and markers along Missouri state highways. Each year 35,000 to 40,000 new signs must be installed, many to replace those worn out, damaged or destroyed. About 60% of signs

are guide markers, 25% regulatory signs, and 15% warnings. Of the total 38%, are reflectorized. The average cost was \$3.80 each for the sign itself and \$1.82 for installation. More than \$600,000 a year is spent on signs, signals and pavement striping.

"Traffic Signs Inventoried," *Better Roads*, March.

Use of Fly Ash In Concrete Pavements

"Map cracking" on Nebraska roads is believed to be due chiefly to excessive expansion, probably caused by a reaction between the cements used and the native sand-gravel aggregates. Following a year's experience with several types of concrete in a 6-mile test road, the Dept. of Roads of Nebraska in 1951 built a 5.8-mile section of U. S. 20, using, for about 85% of it, 165 lb. of fly ash and 5 1/4 sacks of portland cement per cu. yd.; the remaining length containing 7.0 sacks of cement and no fly ash. This enabled the contractor to compare costs of the two types in full-scale operation. Local sand-gravel and air entrainment were used in each. The fly ash is said to improve con-

crete placeability, improve resistance to sulphate-bearing soils or water, lower the heat of hydration, and reduce expansion. It lowers early strength at all temperatures and 28-day strength below 60° F.

"Nebraska Paves With Fly Ash Concrete," *Roads and Streets*, March.

Over-All Treatment Replaced Patching

In 1949 Newton, Mass., had about 200 miles of streets that needed rehabilitating. It was financially impracticable to reconstruct them all at once, and patching was resorted to on streets that were not reconstructed, the patching being paid for from maintenance funds. Rather than continue repeated patching, it was decided to patch only where immediately necessary to prevent complete deterioration, and spend the balance of the maintenance funds available in overall treatment of the worst pavements. The first year \$125,000 was spent for patching and \$75,000 for over-all treatment. The needs for patching of course decreased as streets received over-all treatment, and in 1951 most of the funds went for over-all treat-

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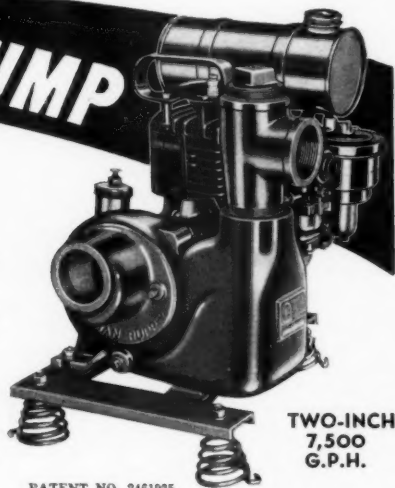
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ment. This treatment is of 4 classes: 2-in. mixed-in-place asphalt surface using $\frac{1}{2}$ - $\frac{3}{8}$ -in. stone; 1-in. mixed-in-place; "sand-mulch," a mixed-in-place asphalt but using coarse sand instead of stone, the thickness varying from $1\frac{1}{2}$ to $\frac{1}{4}$ in. The least expensive surfacing is sand honing and stone sealing, used on streets whose contours have not changed materially but surface cracks and oxidation require treatment. In 1950 the cost of 2 in. mixed-in-place was 75¢ per sq. yd.; 1-inch, 50¢; sand mulch, 25¢; sand hone and stone seal, 11 $\frac{1}{2}$ ¢. In general, each alderman assigned priorities for treatment of the streets in his own ward. The city engineer and street commissioner, however, decided priorities where technical problems presented themselves.

Willard S. Pratt—"Aldermen Help Set the Street Program;" *American City*, March.

Waterway Openings for Bridges

Some old bridges appear to provide unnecessarily large waterways, but the author is amazed that so few of them are inadequate in size of opening, considering the paucity of information available to the designers; and that so many being built today, when such information is available, do not provide adequate opening. Empirical formulas may be satisfactory for preliminary investigations or average conditions; but a qualified engineer with the proper experience and background is the best insurance against trouble in drainage matters.

Charles E. Ash—"Reducing Waterway Opening in New Structure Is Serious Step;" *Better Roads*, March.

Stabilizing Plastic Basic Materials With Lime

Army engineers have converted 797,820 sq. yd. of old highly plastic flexible base materials into dependable bases by using 3% of hydrated lime. The CBR increased 300 to 700%. The existing bases were scarified and lime mixed in and they were then friable and easily rolled and carried heavy traffic for months. It is desirable but not imperative to cure lime-stabilized bases in a manner similar to that used for portland cement. The asphalt surface course placed as soon as possible after completion of the base will provide the necessary curing. Addition of lime in excess of 3% to 6% (depending on the plasticity of the material) has little ef-

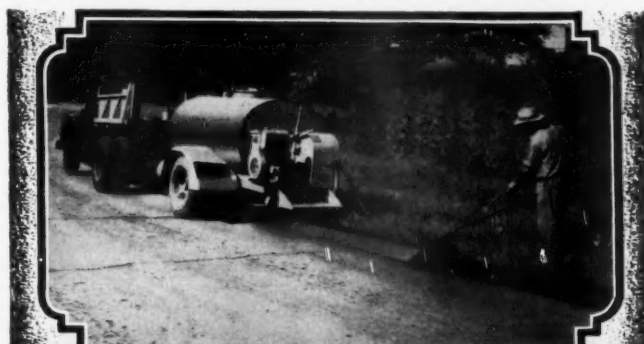
fect. In using portland cement for stabilization of plastic material, such material mixes more readily with the cement if made friable with lime.

Maynard G. Fuller and Gordon W. Dabney—"Stabilizing Weak and Defective Bases with Hydrated Lime;" *Roads and Streets*, March.

Should Design Standards Be Lowered?

Are we retarding the development of the highway system as a whole by holding road design standards at too high a level? Yet can we afford not to employ the highest suitable

standards if we heed the lessons of the past? Answers to this question are contributed by a number of highway administrators. H. W. Griffin, Director, N. J. State Highways says: "A system with only a small part built to the highest standards, with the remainder far below, is not a satisfactory condition." He would not try to build for a future generation if it means leaving this generation in a muddle; but would provide good locations or alignments and wide rights of way. B. E. Gray says "There is not a responsibility placed on any generation to lay all



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its plans for the future; rather it should take care of the problems of the present with some reasonable provision for the years ahead." Both of these suggest that instead of building one road to the highest standard and inviting concentration on it, two approximately parallel roads could be built to a satisfactory standard at no greater cost and each be used for one-way traffic only, which would reduce probability of accidents; and future improvements would not involve the loss of so much capital previously invested in costs of standards aimed at but failing to provide perfect provision for future conditions which it is impossible to foresee.

"What Policy on Standards?"; *Better Roads*, March.

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Large Motor Grader Best All-around Unit. By B. W. Davis, Chf. Equip. Engr., N. C. State H'way Com'n. March, Pp. 32-33.

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Faster Repairing for 9,000 Street Openings. By Paul MacKurray, Chf. Bureau of Highways, Philadelphia, Pa. April, Pp. 79.
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Sidewalk Dangers Can Be Eliminated by Resurfacing. By Robert L. Meyer, V. P. United Laboratories. April, Pp. 99-100.

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Dumping Bridge, Paired Sereeds Help Pave Turnpike's Longest Bridge. By Dan S. Brock, Contractor's Mgr. March, Pp. 53-57.
Stabilizing Weak and Defective Bases with Hydrate Lime. By Maynard G. Fuller and Gordon W. Delaney, Engr. Section, Fourth Army. March, Pp. 64-69, 82.
Nebraska Paves with Fly Ash Concrete. March, Pp. 70-72, 133.
Texas Experience with Colored Route Markers Through Cities. By Fred T. Bennett, Engr., Texas H'way Dept. March, Pp. 80.

Safe Barricading Procedures

WHAT TO DO TO ASSURE SAFETY FOR THE PUBLIC

C. F. WESTLAKE,

Safety Supervisor, Underground Line Department, Detroit Edison Co. in the APWA News Letter

TO provide adequate barricading and job protection it is necessary that the neighborhood be studied prior to starting the job so as to know the habits of residents, movements of pedestrians, children going to or from school or at play, business activities, automobile concentration, parking and traffic speeds and physical features of the street or highway, as curved or straight, rolling or level. A decision must be made as to the type, number, and location of barricades, signs, flags and lights. It should be the responsibility of the foreman, or person in charge of the work to see that sufficient safety equipment is on the job and ready for use before work is started.

On main streets or fire department routes the Police and Fire Departments should be notified of the proposed work. "No Parking" signs should be posted if parking in the work area interferes with the normal flow of traffic. Approval of the police authorities must be secured before posting "No Parking" signs.

Barricading on any job should be done promptly, because the first cycle of traffic is invariably the critical period. The barricades and advance warning equipment should be placed so as to be readily visible to the approaching traffic. The distance for the barricades and ad-

vance warning signs ahead of the work area will depend upon the volume and speed of traffic. In general, they should be placed to divert the traffic smoothly before it reaches the work area.

Protection Details

The barricaded enclosure should contain all equipment, tools and excavated material wherever practicable. Where workmen are exposed to traffic hazards the barricades should be placed to permit the maximum amount of work to be done within the enclosed area. Equipment or excavated material may be placed upon the upstream side of traffic to provide additional protection.

Trenches and excavations paralleling a sidewalk or curb should be covered at all times, except that portion in which the men are working. It is advisable to cover openings on main thoroughfares or heavily travelled streets with steel plates, removing all barricading equipment and excavated materials, allowing traffic to move freely during hours away from the job. These steel plates must be securely anchored. This can be accomplished in most cases by the use of railroad spikes. Noisy plates will always cause complaints. If it becomes necessary to shim the plate to reduce noise, Cold-Pac, hair felt, burlap or old belting give good results.

When construction work has to be done on sidewalks, paths, or lanes where pedestrians usually travel,

hazards, such as, air or water hose, tools, planks and equipment, which could cause tripping or falling must be removed. Pedestrians and property, especially store windows, should be guarded from flying concrete or other materials when pneumatic breakers are being employed. A canvas hung over a barricade will provide this protection. (Only the workmen wear safety goggles, not the pedestrians).

In downtown areas of some of the larger cities, it has become necessary to do construction work at night, due to the heavy concentration of traffic during daylight hours. On a job of this kind the street is cleaned up after each work period and everything removed that might hinder traffic during the day.

Night Lighting

For lighting work areas for night work, if 110-120V current is available it is used; if not available, Homelite generators are employed. We use two sizes 1200W and 2000W; these will furnish power for 12 and 20 100W bulbs. Portable electric amber flasher lights are used to warn and divert traffic before it reaches the work areas. These battery operated flasher lights are of the telescopic type. The height range is 4 feet to 11 feet, lens is 7-in. diameter, flash rate approximately 75 per minute. These units will operate about 300 hours from one set of batteries, at a cost of about 2½¢ an hour. Trucks used on night jobs are equipped with flasher lights which are used when the truck is parked. Red lanterns are placed on barricades parallel to traffic at 12-ft. to 16-ft. intervals. On barricades and equipment at right angles to

traffic they are spaced at 3 to 5-ft. intervals. Red lanterns are also placed on advance warning flag standards at night.

When I was called upon about a year ago to discuss barricading and related street protection, I wrote to several utilities asking for their opinions and practices relating to this subject. Most of their answers to the questions I had listed verified our judgment. However, in a few instances they did think differently. I will present the questions I listed and the answers I received.

Q: What is the proper height to place red lanterns and flags around construction work?

A: Lanterns 2 feet or higher on barricades; flags 4 feet or higher, 5 to 6 feet preferred.

Q: What spacing do you practice for placing red lanterns or flags around excavations?

A: Red lanterns spaced 3 feet to 4 feet crosswise to traffic, 8 feet to 16 feet parallel to traffic. Flags, at least one, preferably two for each barricade.

Q: How far in front of the excavation, or other construction, work, should the first warning sign, red lights, or flares be placed when the excavation or other work is on a straight level street?

A: This will vary according to work location and traffic conditions. (Several warnings and lights can be used from 15 feet to 350 feet).

Q: What is the minimum protected distance on either side of an excavation or work area?

A: Minimum of 3 feet, and more, if possible.

Q: Where are warning signs and lights placed on curved streets?

A: Several signs and lights placed around the curve may be necessary as a forewarning to traffic. Radius of curve, speed, amount of traffic and location of job will determine the location of warning signs and the number needed.

Q: What type of barricade has been found most effective from the standpoint of protection to the pedestrian, as well as the vehicle?

A: Wooden barricades with steel legs for construction work, steel manhole guards, with flags and red lanterns, and trucks with blinker lights for manhole work.

Q: What color used on markers or barricades has been most effective?

A: All replies, except one, agreed that yellow with black stripes was preferred, the exception was for solid red.

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ELKINS PARK, PA.

Q: Which type of light is found to be the most satisfactory for warning around construction work on streets or highways?

A: On construction jobs along highways in suburban areas the kerosene bomb torch was preferred, although some red lanterns are used. On construction work in populated areas the red kerosene lantern hung from barricades is preferred. They are much safer, especially if there is pedestrian traffic or children walking or playing near the protected work area.

Q: For work which requires the removal of a manhole cover and which does not consume much time, what precautions are taken to warn vehicular traffic, as well as to protect pedestrians?

A: In the majority of cases a vehicle is parked in front of the manhole; also, an advance warning sign and flagman are used.

Q: What type of lighting is used to protect the workmen and vehicular traffic while on night trouble work?

A: Most of the utilities have trucks equipped with red flasher lights which are used for this type of work. Red kerosene lanterns and barricades are used if the truck does not give adequate protection. Detroit Edison uses the portable battery operated flasher, as well as the truck flasher lights.

It is impossible to explain every situation you will have to deal with, and the amount of equipment or type necessary. However, if you apply sound principles and good safety judgment you will achieve that which we all strive for, an accident free, well-planned job.

Special Blade on Grader Facilitates Widening and Trenching

GAIL BALL,

County Superintendent of Highways,
Auburn, N. Y.

WE have been using a 5-ft. blader attachment on the 13-ft. blade of our Galion motor grader, and find it far superior to any other methods available to us for widening and trenching work. The same grader can be used for blading material back into the trenched area. Though we use a 5-ft. wide blade, this can be any desired width. This is how the extra blade works:

It is a 5-ft. section of a heavy-gauge moldboard, with the extra blade suspended by two 1¼-inch

bolts, and with hinges. It is placed in the center and front of the regular 13-ft. moldboard, and is suspended 12 to 16 inches below it. The only alterations necessary to the grader to which it is attached is the cutting of the two 1¼-inch holes.

Forward motion of the grader holds the trenching blade in position against the moldboard for trenching; and backward motion of the grader swings it forward out of action. We use the snow plow hydraulic ram, with a cable and sheave connection, to lift the trenching blade up against the grader circle when it is desired to use only the regular blade.

The extra blade will cut up to 16 ins. deep and is especially valuable for widening and trenching work. We use it on our 75 hp Galion diesel grader and find it fast and efficient.

"Sheepsfoot" Rollers

There is a tendency to call all rollers consisting of a drum with protruding feet "sheepsfoot rollers." The term "tamping roller" is also used and is preferable. There are various types of feet used on tamping rollers; the sheepsfoot being only one type. There are four types of roller feet. The cross section of a tapered foot may be of three different shapes (round, rectangular, square). In a variation of the tapered foot one face may coincide with the radial plane of the drum, i.e., be vertical in the utmost lower position. The area of the cross section of a tapered foot is variable, whereas a pegfoot has a constant rectangular cross section. Both the clubfoot and sheepsfoot have the tamping face larger than the cross section of the shank. (The term "shank" is used to designate that portion of the foot other than the tamping face.)

Some tests conducted recently indicate that there is very little difference between the compaction results obtained by use of club feet and tapered feet.

Water Distribution System Maintenance Cost

The maintenance of water mains, including 5,870 hydrant repairs, 106 leaks and 23 valve repairs, cost St. Paul, Minn., \$67.55 per mile of pipe in 1950, based on 680.87 miles of mains in use. Unaccounted for water was 12.88% in 1949 and 13.93% in 1950.

PUBLIC
WORKS

DIGESTS

THE WATER WORKS DIGEST

**The Membrane Filter
for Bacterial Analysis**

Coliform densities are now determined by the "Most Probable Number" technique—a laborious, costly and time-consuming procedure. The data obtained by the method leave much to be desired in accuracy and reproducibility. The application of the membrane filter technique to the bacterial analysis of water suggests a substantial reduction in time, labor, space, and material, with probably more precise results. It permits the concentration of a very small number of organisms from large quantities of water without involving large dilutions or quantities of nutrients. Coliform determination require approximately 18 hours in place of the present 3 or 4 days. The filter membrane is a thin, circular disk approximately 48 mm. in diameter, composed of a cellulose derivative. It is extremely porous, the pore size being controlled in the manufacturing process.

Harold F. Clark and Paul W. Kable—"The Membrane Filter in Water Quality Tests;" *American Journal of Public Health*, April.

**Applying Copper
Sulfate Under Ice**

In February, 1950, Westfield, Mass., experienced trouble with algae in a reservoir under ice 16 in. thick, and decided to apply copper sulfate to the reservoir, which had an area of 72 acres. In applying this, 7 men chopping holes in the ice, covered only 1/10 of the area in half a day, and a more rapid method was desirable. The solution was melting holes by means of superheated steam generated by a Hauck steam thawer used for thawing hydrants. This thawed 1½ in. holes in an average of 38 seconds. The holes were opened at 30-ft. intervals and copper sulfate solution pumped into the water, at high velocity to secure wide dispersion. In 5 days, 6 men and a foreman opened 1600 holes

and applied 1,000 lb. of copper sulfate in a 6% solution.

E. A. Snow and Angelo Iantosca—"Treating Algae Under the Ice at Westfield, Mass.;" *Journal, New England Water Works Ass'n*, March.

**Critical Materials
Supply Problem**

The difficulty of obtaining many materials used in considerable quantities in water works construction and maintenance presents a problem to which there are several partial solutions. One is the obtaining of new materials under NPA regulations. Another is using substitutes. A third is conserving the materials already in hand and reducing the amount of material kept in stock. Each of these requires planning for future needs. Even the smallest cities should have available from job records or invoices, approximate figures on the previous use of materials from which future requirements can be forecast. In recent years even the smaller cities have realized the importance of establishing a purchasing department and combined stores for the various municipal departments; and their purchases and materials kept in store should be based on a plan of probable future requirements. Their records should show daily the amount of each item in store, and its comparison with the plan will tell what new supplies need to be added. There should be rigid checking of incoming and outgoing materials to guard against theft of lead and copper articles, for which junk dealers offer a ready market. The author describes at length how this is effected by the Dallas, Tex., Water Dept. and the savings resulting. Other savings are often possible resulting from preventive maintenance—the detecting and repairing of small defects which will prevent the future necessity of much more extensive repairs or even replacement that would require much greater amounts of ma-

terials. Superintendents should always keep themselves informed about new material or equipment which could be substituted with advantage to that now in use; under present conditions there is the added inducement of the possible impossibility of obtaining some customary materials. Copper pipe may be unobtainable; some of the new plastics may be acceptable substitutes. The shortage of lead for b&s joints does not worry Dallas—they have used portland cement for some years. On 420 miles of 16-in. mains and smaller, laid with cement joints, not a single joint has failed or developed leakage. They also make their meter boxes of concrete.

Henry J. Graesser—"Handling the Critical Materials Problem in a Water Department;" *PUBLIC WORKS*, April.

**Maintenance of
Distribution Systems**

Baltimore, Md. has developed a well-trained maintenance staff and equipped it with proper tools. It restricts operation of valves 12 in. and larger to a special valve-operating crew. It has two valve-operating trucks, equipped with a mechanical valve-operating device, a 750 gpm centrifugal pump, small gasoline-operated pump and complete set of tools. In any system with many valves, it is imperative that at least one crew devote its entire time to a systematic check and inspection of valves. In geared valves, an enclosed gear case is a decided advantage. Many failures in cast-iron mains 8 in. and smaller are circumferential and can be repaired quickly and satisfactorily with pipe repair clamps, which give flexibility to the main and are permanent. Bell-joint clamps are suggested as a means of preventive maintenance when laying a new main in inaccessible locations or at any point where the possibility of future trouble is indicated. In connecting a new service from street to curb with the

customer's service pipe, which often will not take a thread, compression couplings are used. Extremely useful in handling hydrants and large valves is a 1½-ton truck equipped with A-frame and over-hanging trolley beam carrying a 1-ton chain fall. No distribution system operator who has used radio would consent to do without it. Of particular advantage is that using frequency modulation on the single-frequency system. As for safety, a man operating a pneumatic paving breaker must wear foot guards and goggles; when pipe cutters are used, he must wear goggles, etc.

D. H. Goldsborough—"Notes on Distribution System Maintenance," *Journal, American Water Works Ass'n*, March.

Fluoridation of Milk Instead of Water

Fluoridation of water supplies where these are derived from wells may be very expensive. Each well must be provided with a feeding device costing from \$1,000 to \$15,000 to install, and must be serviced and maintained. Only about 0.2% of a supply is used as drinking water, and about 20% of this by

children who would benefit by the fluoride. Water consumption by children varies widely from child to child and for the same child from day to day and season to season. Therefore it is questionable how much of the fluoride added to the water really benefits the children of a community. There is also the fact that use of the treated water is forced upon those who may object to it. The author considers methods by which fluoride may be supplied more positively, in uniform doses, to those who wish it. After considering pills, tooth paste, chewing gum, salt, solid foods and milk, he adopts the last as the most promising. All children drink milk and the amount they drink is subject to far less variation than is the case with water. He has found that the palatability of milk is not affected by the addition of 0.5 ppm of fluoride in the form of NaF. The cost is only 0.0005¢ per quart. He suggests that dairies sell (advertise) fluoridated milk, charging 1¢ per qt. more, perhaps, although the cost to them would be infinitesimal. The amount of sodium fluoride required to treat the whole milk supply of a city for a year would be

only a fourth of that used in a day's water supply. The author does not firmly endorse this use of milk, but urges serious study of the idea.

J. E. McKee—"The Optimum Vehicle for Fluoridation—Water or Milk," *Journal, Maine Water Utilities Ass'n*, March.

A Study of Wells in Illinois

The Illinois State Water Survey has compiled the records of 2604 water wells built for municipal supply, in a study, among other things, of their service life. It was found that the number of wells in active service is less than it was 35 yr. ago, but the individual-well production on a 24-hr. basis increased from 38 gpm in 1900 to 94 gpm in 1948. There has been increasing use of screened tubular wells. Gravel-packed wells, porous-concrete screen wells and perforated-concrete pipe wells have come into use since 1915. Suction-lift pumps, commonly used in the 1890's, have decreased in number since about 1920, and plunger pumps were replaced by double-acting plungers. Now all the old types have been largely replaced by the high-ca-

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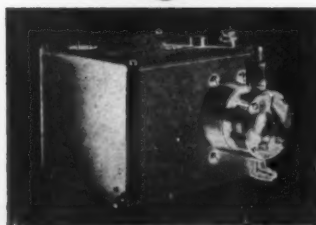
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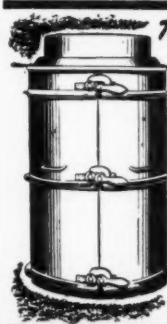
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capacity vertical turbine. Jet pumps for small communities have recently come into increased use. Submersible motor-driven pumps have attained considerable use in recent years.

As to the mortality of wells, more than half the retirements were attributable to formation problems; less than half to failure of the wells themselves. The decline in service life is attributed to their increasingly intensive exploitation.

In discussing this paper, the president of the Artesian Well Co. said that instruments for obtaining information on the behavior of wells have been developed and used to advantage. Employment of better techniques by contractors, new procedures in well development by "shooting", and for cementing of casings and liners, have been adopted from the oil industry. Chemical treatment of wells, acidizing and application of polyphosphates are in early stages of development.

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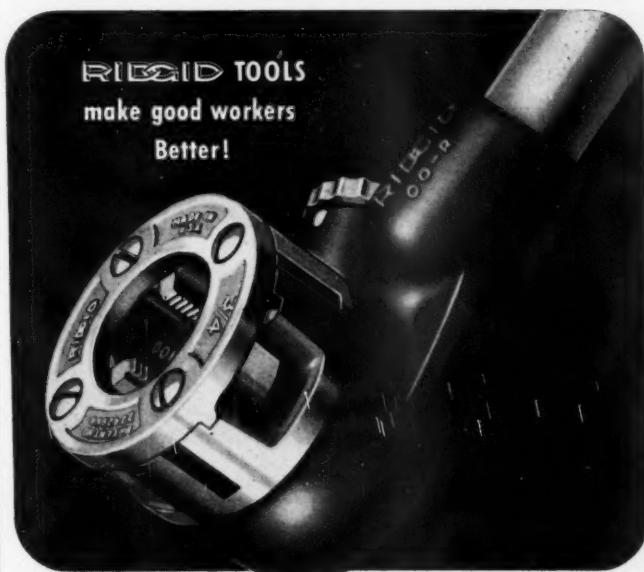
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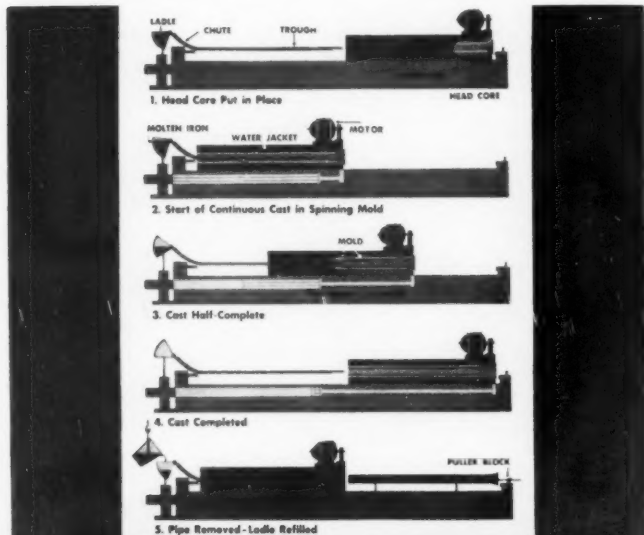
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Radioactive Contamination Is Water Industry's New Problem. By *Sherman L. Rogers*, Metro. Water Dist., Hartford, Conn. March, Pp. 226, 238.

Better Water Plant for Decatur

EXTENSIVE improvements to the water system have recently been completed by Decatur, Alabama. The treatment plant capacity was increased from 4 mgd to 8 mgd, the distribution system was reinforced and improved and a new 2,000,000-gal. elevated storage tank was constructed. The total cost of the project was approximately \$1,000,000.

Water is obtained from the Tennessee River through two intakes. One intake is located on the bank of Wheeler Lake; the other consists of a pump well located on dry land approximately 200 ft. from the lake edge, with a 30-in. gravity main extending approximately 2,000 ft. through the lake to the original river bed.

The treatment plant is of the conventional type for surface supplies, consisting of chemical feed equipment, rapid mix, slow mix, settling, filtering, pre-chlorination and post-chlorination. The original plant did not have mechanical mixing facilities; and housing facilities for pre-chlorination and chemical feed were inadequate for the enlarged plant. The existing chemical feed house was converted to chlorine storage and pre-chlorination. A new chemical feed house was built with lime



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and alum storage on the first floor and the chemical feed equipment on the second floor. Conveyors were installed to load the chemical feed machines with lime and alum, and these machines discharge through an open trough into a concrete distribution box. The water flows from the concrete distribution box into one of two rapid mix units. Each rapid mix unit has a capacity of 8 mgd and each unit discharges into a common flume which connects to two mechanical flocculation units.

The existing plant had four 1 mgd. filters and four new filters of 1 mgd capacity each were constructed. The filter pipe gallery is located in such a manner that anyone entering the filter building will first see the filter gallery; therefore, pipes for the new filters conform as closely as possible to that of the existing filters. This conformation was continued throughout, the only exception being that the new filters have Wheeler bottoms where the old filters had manifolds and laterals.

The existing clear well had sufficient capacity and was continued in use; and the effluent header from the new filters was connected to the effluent header of the existing filters just before entering the clear well.

The existing service or high level pumps were inadequate after the new plant was installed and, in order to obtain an economical installation from a floor space standpoint, vertical turbine type pumps were installed. Two of the existing pumps were maintained for use and four new Layne pumps were installed, together with necessary valves, cast iron pipe, headers, and Venturi tube.

The city had previously installed a new 24-in. transmission main from the plant to the distribution system and the new main plus the old 20-in. and 16-in. transmission mains furnished sufficient capacity for the new plant. Additional 16-in. and 12-in. lines, leading from the existing 24-in. transmission main, were installed to feed the new 2,000,000 gallon elevated tank and to reinforce certain portions of the distribution system.

Pipe and fittings on the project were furnished by American Cast Iron Pipe Company; valves and tapping sleeves were furnished by M. & H. Valve & Fittings Company; pumping equipment was furnished by Layne-Central Company; mechanical mixing equipment was supplied by Walker Process Company; and the 2,000,000 gallon elevated

tank was erected by Chicago Bridge & Iron Company.

The general contractor on the treatment plant was Rust Engineering Company of Birmingham and the general contractor on the feeder mains and distribution piping was Zeigler Appliance & Supply Company of Greenville, Alabama. Engineers for the entire project were Polglaze & Basenberg. George H. Godwin is the general manager of the City Water Department.

The above data are from the Bulletin of the Alabama Water and Sewage Association.

Water-Borne Disease Outbreaks

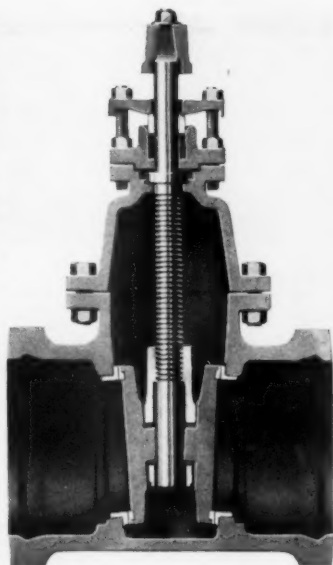
A summary of disease outbreaks due to contaminated water has been released by the Public Health Service for the year 1950. There were only 15 outbreaks reported, with 1,299 cases and no deaths, compared with 25 outbreaks, 1,570 cases and 3 deaths in 1949.

Except for 8 cases of infectious hepatitis and 8 cases of typhoid, all disease is reported as gastroenteritis or dysentery. The hepatitis occurred in Lane Co., Oregon, and was traced to untreated water from a spring. The main typhoid

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fever outbreak, at a resort in Lake Co., Calif., was ascribed to a well which was only 40 ft. from a cess-pool. An auxiliary water supply, not chlorinated; a chlorinator that was not operated; and a cross-connection, resulting in back-siphonage were other factors in outbreaks.

• • •

Cold Weather Landfill

(Continued from page 65)

operations, and as the citizens became aware of what we were trying to do, these cases diminished in number and frequency. The vast majority of persons will not consciously litter an area where it is evident that efforts are being made to keep it clean. The cleaner your landfill area, the more the public will help you keep it clean.

Wet weather can be a serious problem, depending upon the type of access road, the type of soil used for cover, the method of routing the vehicles and, of course, the amount of rainfall. At Bismarck, we have a good, well-maintained, gravel access road; therefore, we have no mud problems up to the last several hundred feet of travel over the top of the fill to the ramp.

Here we endeavor to prevent the occurrence of mud holes or relatively steep grades. The high sand content in our cover material has a definite advantage over a clay soil. Oftentimes the rain shower is not of such length and intensity that normal operations cannot be maintained. Sometimes, however, it is necessary to skim off the muddy surface with the tractor and expose the dry soil underneath. Cinders were also hauled to the site and this material spread over the most slippery areas during periods of excessive rainfall.

Winter Operations

To a native of our state, it is no secret that the months of December, January, February and March will be hazardous to this operation. However, we feel confident that operations may continue by making the necessary arrangements during the good weather period. Since this is our first winter operation, we are experimenting with three different proposals in an effort to find which one is the most practical. First, a stock pile of dry material was made with the tractor. Second, the sod was stripped down to dry material and the area cov-

ered with leaves coming from the fall street cleaning operation. Third, a long, wide trench was dug and as a last resort the garbage will be dumped in here and compacted and covered with snow to prevent blowing, with the final cover of earth being completed in the spring. It should be pointed out here that our soil is a very light, sandy loam which lends itself well to this practice.

We are now experiencing a hazardous period of operation as we have had extremely cold weather along with a considerable amount of snow. At times, during the past winter, Bismarck was the coldest point in the nation with temperatures down to 36 degrees below zero. This, of course, is not new to us but we always look forward to an open winter which we seldom get.

In this cold winter weather we are pleased that the fill area is operating even better than we had hoped. We were very fortunate in uncovering an area which was entirely free of any moisture and we have not, as yet, used any material from our stockpile nor from the area covered with leaves. We are still carrying on the same procedure in compacting and covering

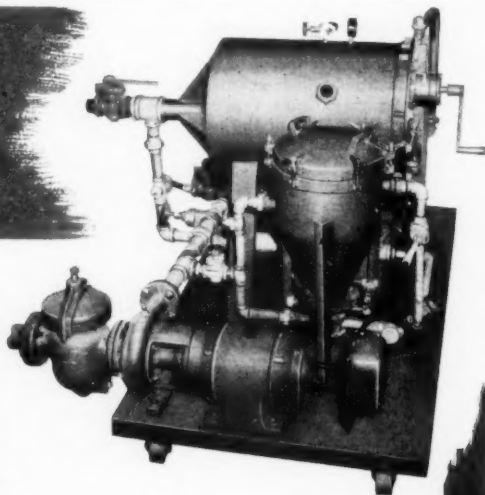
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Complete units, including filter, pump, slurry feeder, debris catcher, chlorinator, and gasoline engine can be furnished ready for mounting on truck or trailer bed. Filters are available with rated capacities ranging from 900 GPH to 72,000 GPH. These standard sizes, however, can deliver far greater quantities of water when necessary, although this is not recommended for general service. Write for literature.



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as we did during the summer months.

Though it was only a short time ago that the equipment arrived at the site, it is now difficult to believe that a smoking, rat-infested, odorous dump ever existed there. Rats have been completely eliminated and the odor of burning garbage is no longer a nuisance to the residents of Bismarck. Those citizens who have had occasion to visit the area have heartily endorsed the project. The motion picture film in its incomplete stage has been shown before service clubs and other organizations and the reactions are gratifying to us. For a city of 20,000 we feel that we have, with the three compactor type collection units, a well balanced garbage collection and disposal program.

Composting Requires Only 28 days

It was stated in our March issue, page 93, that "two or three months are required for composting" garbage. We are informed that this is an error, and that composting by this process requires no more than 28 days.

Two Jumps Ahead

(Continued from page 61)

provide for fire hydrants at suitable—and widespread—places in the landing area for use by the Fire Department in protection against possible fires on crash landings. The large areas involved call for an exceptionally careful study of the layout of the trunk water lines. And the lines must also be considered from the standpoint of reliable service to a vital facility in the event of extreme national emergency.

And finally—because airports are not all concrete and asphalt landing surfaces—the same water mains must also be convenient for agricultural purposes in the control of unpaved areas. We have 653 unpaved acres on the in-use portion of our Airport. It is interesting, by the way, to be able to report that some of our planted acreage not only holds down dust but brings in revenue. A bean crop planted on the easterly approach zone brought in \$2400 one year from the farmer who leased the acreage. Airport officers, at least, have a healthy respect for water mains and their agricultural returns.

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PUBLIC WORKS for May, 1952

As we try to peer into the future, we at Los Angeles International Airport envision a new terminal building taking shape between two sets of mammoth, full-length runways. We see airplanes landing on one set of runways, taxiing to the center of the Airport to unload passengers at the terminal building, and then taking off on the other dual system.

It's an inspiring dream; however, the roar of jet planes on the far border of our field gives us pause. While this country is not at present operating jet transports, it is obvious that their use will become prevalent within the amortization life of the structures we are planning.

We have no experience on which to design to meet the conditions these roaring giants will set for us. What will we do about the jet blast in regard to personal safety of passengers and airport operating crews? How shall plate glass be planned for the structures, observation areas and so forth? What about the pavement?

The only thing we know positively is that there will have to be changes in the current procedures if we are to load and unload jet transports. We already have, in our Los Angeles International Airport field improvement program, the construction of a 100 x 300 foot concrete warmup pad for jet planes, located at the beginning of our 6,000 (planned to be 10,000)-foot instrument runway.

Around the clock, aircraft designers are creating the planes of the future; sometimes, particularly after five o'clock in the evening, as I sit in my office and hear the growl and roar of their latest brain child, I find myself wondering how soon we'll have to redesign the airport for inter-stellar rocket flights. In view of the incredible developments of these past few years, the time of redesigning may be sooner than we expect.

• • •

Digester Gas Produces Power and Saves Money

Garbage is ground and discharged into the sewers in Richmond, Ind. The digester capacity has lately been increased to 596,000 cu. ft. which, based on a population of 60,000, is equal to 9.8 cu. ft. per capita. This capacity is provided by five digesters. Two of these are 95-ft. diameter with floating covers; one is 40-ft., also with a floating cover;

and two are 50-ft. with fixed covers. Gas production ranges from 60,000 cu. ft. per day on Sunday to about 100,000 cu. ft. per weekday, when the ground garbage is added.

Two gas driven engines are used, powered by the sludge gas. One of these is 175-hp, the other 75-hp. The larger engine drives a 4,200-cfm blower which furnishes air for aeration; the smaller engine drives the return sludge pump. To provide a uniform supply of gas to these engines, storage is necessary; and experience indicates that an average 10-hour supply should be stored. Gas storage is provided by a 32-ft. diameter Hortonsphere, constructed by Chicago Bridge & Iron Co., which is designed to operate at 50 psi. The plant is of the activated sludge type.

On the basis of 50 cents per 1,000 cu. ft. of gas, the savings due to utilizing the sludge digestion gas for power ranges from \$800 to \$1,000 per month.

Sound Film Shows Flood Area Sewer Cleaning

Sewer pipe cleaning under disaster conditions is shown in a sound film prepared by Ace Pipe Cleaning Contractors, Inc. This film covers the important work done by Ace following the disastrous flood of 1951 in Kansas City. It is professionally prepared and brings reality to the complicated operation of cleaning sewer mains. The film is available to industry and to cities or similar groups at no charge. For full information write Ace Pipe Cleaning Contractors, Inc., 2003 Indiana, Kansas City, Mo.

Dual Fuel Engine

(Continued from page 57)

automatic safety devices. It cannot be started unless lube pressure is brought up with the motor-driven auxiliary lube pump. The gas is shut off if scavenging air pressure, lube pressure, cooling water pressure or pilot oil pressure drops below prescribed minimums. If the gas supply fails, the engine switches automatically to oil.

In spite of very low rates, the plant shows a substantial profit. In the six-month period under consideration, revenues totaled \$132,930.74 while department expenses, including generation, distribution and administration, came to \$81,552.29, leaving a profit of \$51,378.45 for the half year.

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Virginia Maintenance

(Continued from page 53)

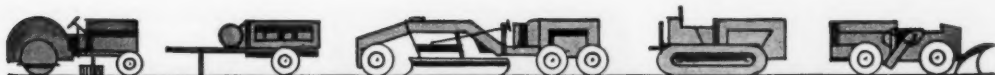
overhead loading feature eliminates continuous backing and turning and is therefore less tiring to the operator.

For Roadside Work

Perhaps one of the more novel pieces of equipment used by the Virginia Department of Highways is our seed spraying machine. This consists of a 700-gallon tank, a 2-inch slurry pump, and a gasoline air cooled, 30-horsepower, power plant for the pump. This truck mounted sprayer is capable of shooting a stream of seed and fertilizer, in solution with water, on a bank 60 ft. from the edge of the hard surface.

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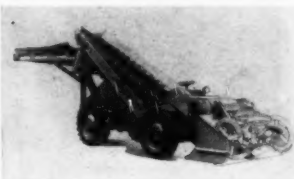
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Stockpile-Windrow Loader Handles Many Materials

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Use coupon on page 26; circle No. 5 - 1

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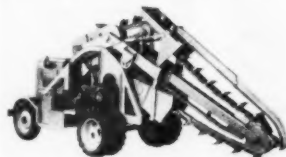
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Use coupon on page 26; circle No. 5 - 11

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Airfield runways and taxi strips can be protected against spillage of jet fuels and consequent softening by a coating of plasticized synthetic rubber and tar blend. Test strips of this material have been installed at Hunter Air Force Base, Ga. Shipment is in drums; placement is by regular paving equipment, followed by rolling. Surface is non-skid. Write Naugeuck Chem. Div., U. S. Rubber Co., New York 20, or use the coupon.

Use coupon on page 26; circle No. 5 - 12

Hydramizer Signals End of Zeolite Run

When the end of a zeolite run has been reached, this device will actuate the valves to regenerate an automatic softener; and in manual or selective units, it rings a bell to warn the operator. Samples are taken periodically and tested. If the water is hard, a red light shows; if it is still soft, a green light. Occupies small space. Full data from Refinite Corp., Omaha, Nebr., or use the coupon.

Use coupon on page 26; circle No. 5 - 13

Fog Nozzle for Basal Dormant Brush Spraying

Made especially for applying dormant oil base sprays to brush, this nozzle disperses a flat fan pattern of infinite-sized droplets in an accurately controlled 10° to 20° spray. An extension is available and operation is through garden size hose. Various spray discs are available. Control is of the trigger action type. Write Bete Fog Nozzle, Inc., Greenfield, Mass., or use the coupon.

Use coupon on page 26; circle No. 5 - 14

NIGHT WATCH LANTERN

Like a
Miniature
Lighthouse
Beacon



For SAFETY — a WARNING LIGHT, seen from *any* angle nearby or from long distances, the NIGHT WATCH is without equal. Optically correct prisms concentrate the light into a vertical "Pencil Beam" of great intensity. Many exclusive features. Very economical to buy and to operate. Burns 100 hours on a pint of kerosene.

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R. E. DIETZ COMPANY
SYRACUSE 1, N. Y.

OVER A CENTURY AND A DECADE OF WORLD WIDE LEADERSHIP

This Light Operates When Regular Power Fails

Plug this emergency light into any 110-volt outlet (DC or AC is available) and if there is any interruption in the regular lighting circuit, this light comes on instantly and automatically. It operates from a dry battery, 6 or 7½-volt. It is portable and self-contained. Write to General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32, Pa., or use the coupon.

Use coupon on page 26; circle No. 5-15



This light never fails

Corrosion-Proof Plastic Pipe in Sizes to 6-inch

Flexible and rigid plastic pipe has been developed which is resistant to rust, rot and electrolytic corrosion. The interior is very smooth, giving high flow capacity. Weight is one-tenth that of equivalent metal pipe. Sizes are from ½-inch to 6-inch. Cemented plastic fittings are used. Complete bulletin from Plastex Pipe & Extrusion Co., 402 Mt. Vernon Ave., Columbus 3, Ohio, or by using the coupon.

Use coupon on page 26; circle No. 5-16

Two New Medium Size Caterpillar Scrapers

For use with the Caterpillar DW10 tractor, two new scrapers have been developed. The No. 10 scraper has a



Medium Caterpillar scrapers

capacity of 7 cu. yds. struck and 9 yds. heaped. The No. 15 scraper has a 10-yd. struck capacity and 13 yds. heaped. Extensions may be attached to either where the material does not weigh more than 2,800 lbs./cu. yd. Both scrapers are similar in basic design. Shipping weights are: No. 10, 15,440 lbs., and No. 15, 17,850 lbs. Maximum carrying capacities are 11.5 and 17 tons. Complete data from Caterpillar dealers or Caterpillar Tractor Co., Peoria 8, Ill., or use the coupon.

Use coupon on page 26; circle No. 5-17

Hydraulic Track Adjuster for Crawler Tractors

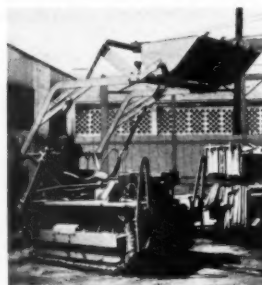
The Hydrajuster is a device that makes easy the adjustment of crawler tracks on all models of Allis-Chalmers, Caterpillar and International crawler tractors. Installation can be made in the field, and requires about 1½ hours after the tracks have been broken. A few shots from a standard grease gun takes up the slack in loose tracks. Machinery Parts Sales Corp., Box 7682, Dallas, Tex., or use the coupon.

Use coupon on page 26; circle No. 5-18

Hydraulic High Lift Bucket for Agricat

A new bucket has been designed for the Agricat crawler type tractor. This bucket has 5 cu. ft. capacity and adds one more to the labor-saving devices available with this tractor. With attachments, leveling, back-filling, materials handling, snow removal, bulldozing, etc., are possible. Full data on the bucket and on Agricat from E. H. Pence Co., Inc., San Leandro, Calif., or by using the coupon.

Use coupon on page 26; circle No. 5-19



New bucket for Agricat

Three-Cylinder 30-45-HP Diesel Engine

This is a 3-cylinder diesel, with a speed range of 1200 rpm, and it is rated at 30 to 45 hp. It is available as a generator set, a pumping unit or with connections for direct or belt drive, and intended for stationary applications. As a power unit, it develops 20 to 30 kw in all standard voltages, 50 or 60 cycle. Data from Nordberg Manufacturing Co., Milwaukee 1, Wisc., or by using the coupon below.

Use coupon on page 26; circle No. 5-20

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Eagle cinder crusher.

When snow or ice makes traffic conditions dangerous. It also can be used for making marketable material for cinder concrete or cinder blocks. It will produce 15 tons of minus $\frac{3}{4}$ -inch and up to 50 tons of minus $\frac{3}{4}$ -inch material per hour. It can be mounted above a bin for loading into trucks. More information on request from Eagle Iron Works, Des Moines, Ia., or use the coupon.

Use coupon on page 26; circle No. 5 - 21

Design of Small Concrete Mixer Speeds Operation

This is a tilting type, end discharge, concrete mixer that meets AGC specifications for $3\frac{1}{2}$ cu. ft. material capacity plus 10%. Drum capacity for unmixed material is $5\frac{1}{2}$ cu. ft. Features include V-belt power transmission, four mixing blades, easy tilting device and tow pole locking system. Koehring Co., Milwaukee 6, Wisc., or use the coupon.

Use coupon on page 26; circle No. 5 - 22

New FHP Motors are Lighter and More Versatile

These new GE fractional horsepower motors weigh as much as 51% less per horsepower than previous models and are considerably smaller. These are available in open, drip-proof and totally enclosed fan-cooled models and are suitable for nearly all small-motor applications. Ask for Bulletin GEA-5567 from General Electric Co., Schenectady, N. Y., or use the coupon.

Use coupon on page 26; circle No. 5 - 23

A Radiation Measuring Instrument—The Gammometer

For applications where large liquid or solid samples must be utilized for accurate measurement, this new Gammometer is well suited. It will accommodate volumes up to 200 ml. The 1 microcurie range can be used to measure activity concentrations down to 5×10^{-10} curies per ml. Pre-

Dear Editor:



Letters from you men in the field are always exciting reading to us. We are pleased to learn of the doings of our many friends. But we also look forward to reading the letters that ask for more information, agree or disagree with opinions expressed in our editorials or comment on articles we have published.

Those with the broadest appeal are published each month in our "Letters of Interest" column in PUBLIC WORKS Magazine.

We think you will enjoy reading them. In the same way other engineers all over the nation would like to read what you have to say. So let us hear from you too, from time to time, when you have something on your mind.

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See our file in Sweet's

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cision is better than 1%. Full information from Ohmart Corp., 2347 Ferguson Road, Cincinnati 38, O. or use the coupon.

Use coupon on page 26; circle No. 5-24

New Electric Foodwaste Disposer for Kitchens

This new electric foodwaste disposer, called the U. S. Kitchen Disposer, has been designed to permit maximum ease of installation and quicker servicing. It is operated by a 1/3-hp motor, with a safety cover operation control. Distribution will be through regular trade channels. Information can be obtained from U. S. Radiator Corp., 300 Buhl Bldg., Detroit 26, Mich., or use the coupon.

Use coupon on page 26; circle No. 5-25

Water and Sewage Short Courses

The Civil Engineering Department of Pennsylvania State College, State College, Pa., will hold the 5th annual sewage works operators school June 10 to 14 and the 5th annual water works operators school on June 24 to 28. Complete information on these schools can be obtained from Prof. R. Rupert Kountz.

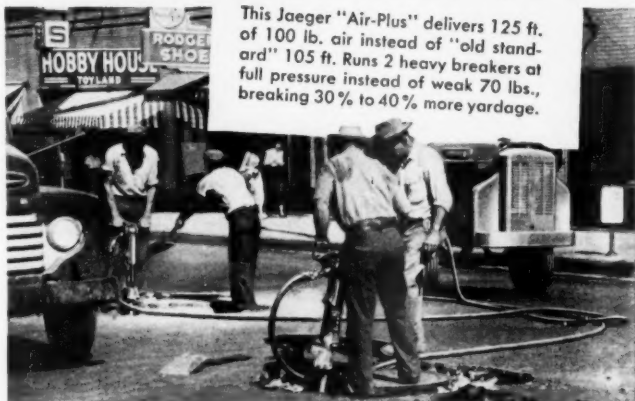
PERSONAL NEWS

Greer & McClelland, consulting engineers of Houston, Texas, have opened an office at 93 Greenwood Ave., Montclair, N. J., under David M. Greer as resident partner. The firm specializes in soil mechanics and foundation engineering.

Buck, Seifert and Jost, consulting engineers of New York City, have been retained by the city of Bogota, Colombia, to develop plans for additional water supply. Also, by the Companhia Antarctica Paulista, Sao Paulo, Brazil, for water supply and treatment for a new brewery.

C. S. Mullen of the Virginia Department of Highways was the recipient of the Bartlett award, conferred on him at the January meeting of the Highway Research Board. John J. Forrer, for many years Maintenance Engineer of Virginia, and more recently Assistant Chief Engineer, has resigned to become executive director of the Virginia Asphalt Ass'n., Inc. Lewis E. Akers, formerly Secondary Roads Engineer, succeeds Mr. Forrer as Assistant Chief Engineer and Samuel D. Crute assumes the position formerly held by Mr. Akers.

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See your Jaeger distributor or write for Catalog JC-1.

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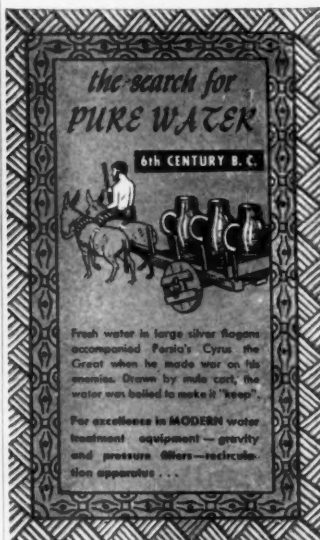
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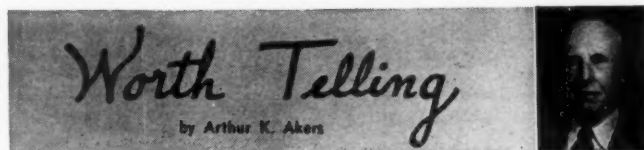
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by Arthur K. Akers

★ **WORTHINGTON CORPORATION** is the new name of Worthington Pump & Machinery Corporation, changed to present a more adequate picture of the Corporation's wide diversification of products. See their announcement in this issue.

★ **DON J. PHILLIPS** is now sales manager, The Austin-Western Company, Aurora, Ill.; with J. Arthur



Mr. Phillips



Mr. Fitzenz

Fitzenz as assistant. Robert H. Diller becomes assistant advertising manager.

★ **ROOTS-CONNERSVILLE BLOWER CORPORATION** has been absorbed into the corporate structure of its parent, Dresser Industries, Inc., as a Division.

★ **ROBERT C. BECHERER** succeeds George F. Torrence, retired, as president of **LINK-BELT COMPANY**. Mr. Torrence has been reelected a member of the board of directors and will serve as a member of the executive committee. All other officers were reelected.



Mr. Becherer

★ **INTERNATIONAL HARVESTER** again has two mobile schools on its industrial power products on the road. College engineering classes, distributor servicemen, and equipment operators will be its "students."

★ **N. E. TUCKER** is now vice president in charge of sales, the **RE-FINITE CORPORATION** of Omaha, water treatment equipment.

★ **HUBER MANUFACTURING COMPANY** appoints F. W. (PETE) GILLETTE district sales manager for six eastern states, headquarters in Washington, D. C.

★ **GAR WOOD INDUSTRIES** changes W. C. ROBERTSON from vice president—export to vice president—government sales and regulations.

★ **ARTHUR A. LEVISON** is new vice president and general sales manager **BLAW-KNOX DIVISION**.

★ **RUSSELL C. C. DUBOIS Jr.** is now sales manager, RCA mobile and microwave communications equipment, Radio Corporation of America, Camden, N. J.; succeeding Dana Pratt, transferred.

★ **C. N. REES**, of **STANDARD STEEL CORPORATION**, Los Angeles, now adds the duties of vice president in charge of manufacturing to those of sales manager.

★ Here's steel grating pioneer **WALTER E. IRVING** (left) president of the **IRVING SUBWAY GRATING COMPANY**, Long Island City, N. Y., receiving a testimonial scroll celebrating his firm's 50th anniversary of activity in this field.



Mr. Irving (left) receives scroll.

★ **JOSEPH A. SNOOK** is vice president, sales, **ATLAS MINERAL PRODUCTS COMPANY**.

★ **WARD H. PITKIN**, assistant general sales manager, **OLIVER UNITED FILTERS**, moves to Oakland, Calif., in the course of company expansions, but will be east often.

★ **DRAFT DOCTOR**, examining prospective GI, "Read that chart."
"What chart?"
"That's right, there isn't any. You're in, soldier!"



LOCK JOINT

WISCONSIN
MICHIGAN
DETROIT ●
ILLINOIS INDIANA OHIO

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AUGMENTING THE DETROIT OPERATION are our three other modern permanent pipe manufacturing plants. Each of these plants is strategically located to serve the rest of the country East of the Rockies. The Wharton, N. J., plant covers the East; Columbia, S. C., the South; and Turner, Kansas, the Great Plains. No matter how large or small your contracts may be, if your pipe requirements are 16" in diameter or larger, you can rest assured that the efficient and economical answer to your pipe problem can be supplied from one of these four Lock Joint Plants.

SCOPE OF SERVICES—Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains in a wide range of diameters as well as Concrete Pipes of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous Lines.

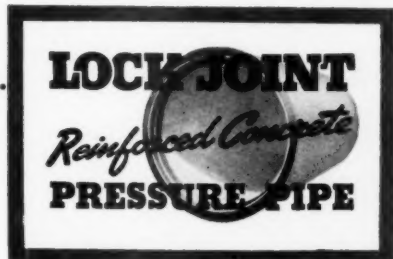
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Basis research, for example, while not necessarily essential to each particular installation, is, nevertheless, the life blood of sound equipment. W&T research developed the Visible Vacuum Principle, residual recording, the Break-Point Process and countless other advances in the art of chlorination. This same research is constantly at work to insure that the W&T Equipment you buy is up-to-date in every respect and will not be outmoded before its time.

The desire for that assurance may be another reason for the ever growing demand for W&T Chlorinators.



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Techniques Often Lie In W&T Research

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